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THE PRACTITIONER

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THE PRACTITIONER

JULY

1921

Editorial.

Our Lists
quite full.

WE do not often address our readers, but we think the following remarks may be of particular interest. It has not been possible for us to make them before, but now that matters appear to be settling down, we feel that we should like to thank the Profession for the loyal and splendid support accorded us during all the trying and difficult times which, in common with other periodicals, we have experienced. By reason of this support we have been able to surmount all obstacles; we have been able to overmaster all opposition, and we are now riding strongly on the flood tide of success. Our subscription lists are quite full, and we are unable to accept any new members until next January. Our position is, consequently, a happy one. Once again to the Profession, therefore, we would express our thanks and appreciation.

The War.

Although THE PRACTITIONER was very active during the war, no items from its pages, nor its achievements, were chronicled in the lay press—a practice all too prevalent with medical publications and one

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which is to be severely condemned at all times; but for real solid work, and for substantial service to the Government and to the Profession, we give way to no other journal. Our readers may be interested to know that THE PRACTITIONER went to almost every medical man serving in all the theatres of war, in all the expeditionary forces, and in the base hospitals; it was specially ordered for use in the Australian Service hospitals by Colonel Fiaschi, Director of the Australian Medical Services, who personally called at our offices to make the necessary arrangements. The Royal Navy also ordered copies, and telegrams were sent from the flagship of the Grand Fleet to expedite delivery.

The
Special War
Numbers.

Our readers will remember that we issued some special war numbers which without doubt helped to save many valuable lives. These numbers proved to be exceptionally useful, so much so that the Director of the War Museum visited us for the purpose of obtaining copies to place in the War Memorial Museum. We should like, even at this late hour, to thank the officials of the Medical Department of the War Office for the assistance they rendered, and for the promptitude with which the numbers were passed by the Censor. The difficulties of production during the war were great, but quiet unassuming work carried through the special issues, and not a single ordinary number of THE PRACTITIONER was a day late in publication even under the most depressing conditions.

Like all successful undertakings, we have Strengthened our enemies who occasionally think it Confidence. necessary to attack us; but as the attacks are never justified, and have no real foundation, they act as an excellent advertisement, and result

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in strengthening the confidence already placed in THE PRACTITIONER by the Profession. We shall endeavour always to merit that confidence. On our side, we have done everything possible to produce a first-class journal, and our purpose throughout has been to serve no faction or party, political or social, but only to advance the abiding and permanent well-being of the Medical Profession, which has not been slow in showing its appreciation.

Howard Street, Strand,
London, W.C. 2.

Pleurisy.*

By SIR W. HALE-WHITE, K.B.E., M.D., F.R.C.P.

Consulting Physician to Guy's Hospital, etc.

THE commonest and most constant symptom of pleurisy is pain in the chest. There are, fortunately, some pains which never seem to be mistaken for pleurisy; for example, that of angina pectoris, of a growth, or of an aneurysm; but there are those which it is well to bear in mind. Sometimes these pains are called "pleurodynia," which is only a high-sounding phrase and is no diagnosis at all. The pains comprehended under that term are not only those of pleurisy; it may be that the pain is caused by the fact that the patient has ruptured a few muscle fibres from excess of coughing. The best thing to do to stop it is to strap the chest. Unfortunately, the patients have often coughed so much and are so short of breath, that this can hardly be done.

Another group of people, who have pain in the chest which is sometimes mistaken for pleurisy, are those who are suffering as a patient suffers when he has lumbago. Nowadays, the fashionable thing is to suppose that a patient with lumbago has some fibrositis of the fibrous part of the big muscles in the lumbar region. Similar pains may occur in the muscles of the chest; when they do, they are naturally found where muscle is most in evidence, therefore in the back or the pectoralis major. The

* Based on a post-graduate lecture delivered at the Prince of Wales Hospital, Tottenham; specially rewritten and revised for THE PRACTITIONER by the author.

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best thing is to apply some liniment, friction, and massage, just as for lumbago. One useful liniment is equal parts of menthol and chloroform to double the quantity of olive oil.

Many patients, again, have a genuine neuralgia in the chest. Probably it is similar to the pain which occurs with herpes zoster, which is one of the worst pains in medicine, and will remain long after the rash of the herpes has passed away. Women—especially anæmic women—are very liable to complain of a neuralgic pain under the breast. These last two pains—fibrositis and neuralgic pain—may be relieved by the same remedy. In both of them there is local tenderness, especially when the muscle is pinched up; or, in the neuralgia, when the skin is so pinched.

Further I have known disease of the ribs mistaken for pleurisy. I have seen tubercle of the ribs, gumma on the ribs, growth in the ribs; I have never seen ribs infected with typhoid, although that has been described. Then, again, though very rarely, the pain of pericarditis may be mistaken for pleurisy. And perhaps the commonest of all is the pain in the chest due to indigestion. I had not been on the staff of my hospital long, before a medical student came to me perfectly sure that he had a malignant disease of his sternum. He was not comforted until he got better—by treating his indigestion.

When pleurisy is suspected, the chest should at once be listened to; and it would be thought that nothing was easier than to tell a pleuritic rub. I must confess that, very often, I am in doubt whether a sound heard in the chest is that or not. Not all pleuritic rubs are heard both at inspiration and expiration, as the books tell us. There is no golden rule for telling one. You must simply take as much care as you possibly can.

Pleurisy at the side of the chest is comparatively

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easy to diagnose, but there are one or two situations in which it is very difficult to diagnose. There is diaphragmatic pleurisy, and that is very often a serious thing. If, for instance, a person has pneumonia and has diaphragmatic pleurisy, personally I regard the outlook as dangerous. In olden text-books you will find it stated that diaphragmatic pleurisy is usually fatal. I have known many cases recover; but I regard a patient as being dangerously ill, if I suspect his pleurisy to be diaphragmatic.

How can we tell diaphragmatic pleurisy? In the first place, if there is any pain, it is low down, usually somewhere about the tenth rib. Next you can often observe that the patient does not move his diaphragm properly. Thus, when the patient inspires, the diaphragm does not descend on the side of the pleurisy because it is inflamed, with the result that, at the end of a deep inspiration, the other side of the chest expands and the abdominal muscles come out, and it is easy to notice the drawing in of the ribs on the side of the pleurisy. Very often, this evidence of it is not present; but if you suspect it from the position of the pain, you will be surprised how often your suspicions are confirmed by noticing a rub low down. That means that the diaphragmatic pleurisy has spread round the edge of the lung.

Another position of pleurisy that bothers us sometimes—again quite common, but not of the same serious significance—is when it occurs between the pericardium and the lung. Obviously, the noise that you hear on auscultation is compounded of two factors—of the rub caused by the beat of the heart and the rub caused by the inspiration and expiration. So that, if you tell the patient to hold his breath, you notice that the sound is altered; and that, as you know, is a common way of telling exocardial murmur from endocardial, many of the first being

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due to pleurisy in that situation.

I do not propose to go over all the signs of pleurisy. They are in every text-book, and you all know them. With regard to the treatment of it, I think there are two things to bear in mind. What do you want to do? If it is only a dry pleurisy, what you want to do is to get the visceral and parietal pleuræ to adhere. Therefore, it is desirable to hinder movement, and to do this you must strap the chest; and, in the dry pleurisy, that will help to remove the pain and promote the healing.

If there is fluid, but not of sufficient amount to make you wish to take it out, you want to get that fluid absorbed. You are most likely to get it absorbed if the patient is opening out his lung and his lymphatic spaces; therefore, if there is fluid, do not strap the chest; but if there is no fluid, it is a very good treatment.

So much for dry pleurisy. Now let us consider cases in which we think there is some fluid. The greater number—the proportion has been estimated as high as 75 per cent.—of all clear serous effusions in the pleural cavity are tuberculous. Of the remainder, some are complicating Bright's disease, heart disease, and so on. I am sure that many medical men do not warn the patients enough that simple pleuritic effusion is most often tuberculous. The evidence, as you know, is very strong. Long before the days of the discovery of the tubercle bacillus, it was known that these cases were really tuberculous, for the reason that if you took 100 people who had been into the hospital with simple pleuritic effusion, and followed them up, you would find that the mortality among them from phthisis was much higher than among the population at large. That has been confirmed by bacteriology, for, if you centrifuge the fluid removed in these pleuritic effusions you may find that

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they contain the tubercle bacillus, and on inoculating a guinea-pig with the same fluid you may demonstrate their tuberculous character.

Before leaving the question of the nature of the fluid, I should like to tell of one rare thing to bear in mind. It is always worth while to see whether the fluid you remove is albuminous or not. All ordinary pleuritic effusion fluid is albuminous, but hydatid fluid is not. I can tell a very dramatic story in that connection.

A doctor's wife had fluid in her chest. She was seen by another doctor in the same town, who aspirated her chest, and did not notice whether the fluid contained albumen. Fearing that it was a tuberculous case, he sent her away for six months. She was not benefited. She passed through London on her way back—and I was asked to see her. I put a needle into the chest and aspirated fluid containing no albumen. She was operated on, and hydatids were evacuated from the chest. Unfortunately, just after the operation, a yellow fog set in over London, lasting three or four days, and that killed her. Nevertheless, if we had known six months earlier that the fluid was hydatid, and not tuberculous, it is quite likely that woman's life would have been saved.

A ridiculous instance happened to me the other way.

When I lived just outside the hospital, the house-physician came round to me to say that he had aspirated a chest as I had told him to do, and that it contained hydatid fluid. "How do you know?" I asked him. "Why," he said, "I can see hydatid cysts." We went across, and he showed me the fluid, and floating about in it were the usual rounded coagulated masses of albumen, some of them nearly as big as an egg. "Are those the hydatids?" I said. "Yes," he answered. "Well," I said, "how do you think they got through the needle?" "Upon my word," he replied, "I never thought of that."

From examining candidates I am much struck with the fact, that many of them think that the side of the chest is generally distended when fluid is effused. They have difficulty in passing if they think that, when I am examining them. When fluid is poured out into the pleural cavity the lung is compressed, and because of the difficulty of breathing on that side, it becomes collapsed too. So that you have three things happening: fluid going into the chest

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cavity, the lung getting compressed, and the lung collapsing. Clearly the chest cannot possibly be distended, unless the bulk of the fluid effused is greater than the loss of bulk of the lung that is shrunk, compressed, and collapsed, and that rarely happens. Indeed, the bulk of the lung often diminishes more than the bulk of the fluid effused. It is by no means uncommon, therefore, when there is fluid in the chest to find that the side of the chest with the fluid in it is actually smaller than the side which is healthy.

With the physical signs of fluid I need not bother you. I would only remark that anyone with any practice can tell the dull note of fluid from solid lung—it is very much more dead and dull. And the auscultatory signs are not nearly so valuable as the other signs of fluid, which is not surprising, because the auscultatory signs will depend largely upon how well they are conducted through the fluid, the layer of which may be thin but extensive, or more thick but local.

Further, the auscultatory signs are much affected by the degree to which the patient has pain, and keeps the chest still. I have been struck by the fact that very often people do not estimate enough the value of skodaic resonance in pleural effusion. It is an extraordinarily valuable sign, quite impossible to mistake, very constant, and more definite in pleural effusion than in any other condition.

Depression of the diaphragm is sometimes given as a symptom of fluid. That is excessively rare. It is a very difficult muscle to depress by fluid in the chest. But one of the commonest of signs, and the most valuable, is the pushing over of the heart. Do look for that, but remember that the degree to which the heart is pushed over is no guide to the amount of fluid present. You would not expect it to be. Because, as I have said before, there are three

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factors: the amount of fluid, the amount of compression of the lung, and the amount of collapse, and if the lung is not much compressed or collapsed, a comparatively little fluid will push the heart over.

During the last few days I have seen a man distressed with fluid in the chest, and the heart pushed over to the right. Yet on aspirating him we got only 15 fluid ounces out, but I think we got all there was, for after aspirating that amount the heart was back in the normal position.

Stomach resonance is not often loud in cases of pleural effusion. The books make a good deal of Grocco's sign—a triangular dullness on the opposite side of the chest to that on which the fluid is effused. I have seen it, but it is so frequently absent that it is a sign of very little value.

The amount of fluid effused may be very large indeed. The greatest amount I have ever withdrawn from a chest myself is 200 fl. oz.

He was a big man from whom this was withdrawn, but where it all got tucked away it is difficult to imagine. There was, however, no doubt about it. One point in connection with these amounts. Such a large amount as I have just mentioned, or anything over 100 fl. oz., must displace the heart a good deal, and that is a dangerous condition. Cases of excessive pleuritic effusion have been known to die suddenly, therefore empty the chest as soon as the case is seen and let the fluid out slowly. The explanation of the sudden death is that the heart is much hampered in its action by being pushed over.

I have got some very interesting evidence showing the rate at which the fluid accumulates.

I happened to be at the hospital one evening after dinner, and my house-physician said, "I wish you would come and see a woman in the ward." It was a case of large pleuritic effusion. She had been in for some time, and we had already drawn off, on December 11, 12 oz., and on December 16, 36 oz., and this was December 17 when I saw her. I found her very ill, as the house-physician had said, with great dyspnoea, and a large amount of fluid. We withdrew there and then 106 fl. oz., and I think we got it all off (she was a smallish woman). Thirty-six hours later I had to aspirate her again, and we got out over 90 oz. It is evident that, supposing we got it all out the first time, the fluid must have been poured out into that chest at the rate of nearly 3 oz. an hour—which is a stupendous amount. She lingered on

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for several months, so that I could not verify what I suspected, but I think she must have had some thrombosis of her azygos veins. I do not think my failure to find any such thrombosis at the post-mortem eventually negatives the idea of such being present at the time the rapid effusion took place, because other cases have shown that thrombosis of veins will clear up, so that if you look at a case so many weeks after thrombosis has occurred no signs of it may be found.

If the fluid is bloodstained when you draw it out, it must, I think, be caused by one of two things, putting aside hæmothorax due to trauma; it must be due either to tubercle or to growth. Do remember that it may be tubercle, just as a tuberculous case may bleed into the lung in the ordinary hæmoptysis; if bloodstained fluid is caused by a growth, do not aspirate it. I have seen doing so lead to death. In this case it was found, post-mortem, that the hæmorrhagic pleurisy was due to a growth, and the taking away of the pressure of the fluid induced still further hæmorrhage from which the patient died.

Then the last point in connection with simple fluid, is to bear in mind this: that the rapidity with which the fluid is effused into the chest during the last few hours—the “agony” as it is called—is remarkable. It has happened to me over and over again to have been certain, even to the degree of putting in the needle, that there was no fluid in the chest, and yet a post-mortem 24 hours afterwards showed a considerable amount of fluid there. The demonstrator of morbid anatomy often jeeringly remarks that the physician must have been ignorant of his physical signs. Not so at all. It is the demonstrator of morbid anatomy who is ignorant of the fact that when the circulation is failing, pleuritic effusion is quite common.

Now, I pass on to the state of affairs when pus is formed. Seventy-five per cent. of all empyemata are pneumococcal, and it is interesting to bear in mind that the frequency of empyema has much increased

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during my lifetime. The text-book that was used by everyone, when I was a student, was Bristowe's *Medicine*. Empyema as a complication of pneumonia is not mentioned in it, and it is a very good text-book, too. All sorts of other complications are mentioned. That omission is almost incredible nowadays. I was so interested in the subject that I went through a great many figures from Guy's to see whether the frequency of empyema had been increasing, and I found that it had most strikingly. In the eight years from 1891 to 1898, the cases of lobar pneumonia complicated by empyema were 4·24 per cent., but in the eight years preceding that period the total was only 1·5 per cent., and I should judge from my own experience that the percentage has been going up considerably since 1898.

Another interesting point which is rather difficult to prove, is that sometimes you may get a pneumococcal empyema without any pneumonia. The proof is this:—

A man was admitted under me with rapid breathing, high temperature, an onset with rigor, pain in the chest, all the classic signs of pneumonia, even down to dullness and bronchial breathing, so much so that he was used as a case for teaching students the signs of pneumonia. He developed an empyema, which was opened, and he died very shortly afterwards from the intensity of his toxæmia. From the pus we got a pure cultivation of pneumococcus, from the lung we could get no cultivation of pneumococcus, and there was no histological evidence whatever that there was any pneumonia.

Naturally, as it is such a serious complication, you will want to know how to tell when an empyema is coming on. Although I have just quoted a case in which there was no pneumonia, yet the great majority of empyemata succeed an ordinary pneumonia; and the best guide, as a rule, to the onset of the empyema is the temperature. The temperature of a pneumonia has been for days, say, 103°, and then there is a crisis. For a day or two the temperature will remain down; then it begins to go up—a hectic temper-

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ature—and that ought to make you suspect that the patient has an empyema. There are two things about this which are very difficult to explain. One is why, when the man is infected with the pneumococcus, his temperature is more or less level about 103° during the time of his pneumonia, but when this is followed by a pure pneumococcal empyema the temperature takes a different type—the usual hectic temperature. Nor do I understand why he has an apyrexial interval at all, if he is infected with the pneumococcus. In some other cases the temperature never comes down to normal, and yet there is an empyema; but even then the type of temperature changes. Take a typical pneumonia: the temperature is constantly somewhere about 103° ; then, after a few days, towards the end of the pneumonia, it gradually assumes a more up and down type. That should make us suspect pus, even if there has been no apyrexial interval at all.

There are other things to be thought of with regard to temperature. It does not follow that, if a man's temperature keeps up in either of these two ways, he has got an empyema. Pneumonia is the local manifestation of a general infection which may show itself elsewhere. The temperature may keep up because of pneumococcal abscess elsewhere. Then, unhappily, as occurred in the case of the last doctor whom I saw suffering from pneumonia, the temperature may occasionally keep up from another cause; this patient developed a rough endocardial murmur, and the diagnosis of malignant pneumococcal endocarditis turned out to be correct. But although it may mean that the patient has a pneumococcal infection elsewhere, generally speaking, the keeping up of the temperature after pneumonia means that the patient has got an empyema.

Often people comfort themselves, when pyrexia

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continues, with the supposition that the reason for the high temperature continuing is delayed resolution of the pneumonia in the lung. I know that may happen. I should say offhand that pneumonias were slower in getting well nowadays than they were 20 years ago. But it is such a serious thing to overlook an empyema, that we should not go home comforting ourselves with the idea that we have a case of delayed resolution until we have definitely put out of court the possibility that it is one of empyema. It is very rare indeed for an empyema not to cause a rise of temperature. I have known one case. It was a patient in whom there was a pneumonia which ended by lysis, and the dullness of the apex did not clear up (it had been an apical pneumonia). Pus was found although the temperature was perfectly normal.

The formation of an empyema may be very long delayed.

A patient was taken ill on September 23 with pneumonia; on October 15 he was much better, and from then to November 6—it is a long while from September 23 to November 6—his temperature was only 99° in the evening. From November 6 to 12 the temperature was 101° in the morning and 103° in the evening. We went over the chest very carefully, and we found a small empyema containing only 4 oz. of pus. That must have been an extremely slow business.

The temperature does not bear any relation to the amount of pus. For example, I have known in an empyema the temperature never higher than between 99° and 100° , and yet nearly three pints of pus have been let out of the chest. But, while I have mentioned these exceptions, remember that the two main types I gave first are the common everyday thing for the temperature in empyema complicating pneumonia.

It is often not easy to diagnose where the empyema is, and we must know where it is if we are to let out the pus. We must welcome every sign that will help us. Perhaps I might point out why it may be

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difficult to tell where the empyema is. Go down to the post-mortem room and you will soon see. You have a large area—much larger than my two hands—over which a thick lymph, very often a quarter of an inch thick in the two layers together, the visceral and parietal pleuræ, is sticking together. It covers an area of many square inches, and somewhere among that there is a collection of pus. It is, therefore, very difficult to find out exactly where it is. You may frequently needle the chest without coming across it. Twice it has happened to me to find the empyema by putting the needle in, and on calling on my surgical friends to do the operation, they have had the greatest difficulty in finding it, and have had to make many punctures, although the patient was under the anæsthetic, and they knew where the needle went in originally. In one case, twenty punctures had to be made before the spot was hit. The smallest one I have ever found contained only $\frac{1}{2}$ oz. of pus. The chances of finding that with several square inches of thick pleura are very small. One sign of great value is local tenderness. I am inclined to attribute the greatest importance to the plan of putting the needle in where the patient says it hurts most when you press the chest.

Another reason why it is difficult to find empyemata is, frequently, because they occur in parts where you could hardly hope to find them by putting in the needle. For instance, they may be between the diaphragm and the base of the lung, or between the lobes of the lung, or between the pericardium and the lung; or, again, they sometimes occur underneath the scapula where you cannot reach them with the needle. It has been my occasional experience that, when we fail to find an empyema in the ordinary way, we are inclined to attribute our failure to the fact that the empyema is in one of these comparatively

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inaccessible positions. Often that is not so; we have missed it in a common position, that is, between the outer surface of the lung and the wall of the chest.

If you suspect an empyema is in one of these out-of-the-way positions, let me implore you not to push the needle in to try and find it, because the needle must traverse the lung before it reaches the pus, but then as the needle is withdrawn the lung will be infected by drops of pus exuding from it. I have seen a whole row of little pulmonary abscesses due to this cause.

Some people will tell you that they think they can cure empyemata by aspirating the chest only. I have tried aspirating the chest for pus, and have never known it to succeed. The pus will re-collect. With regard to cases supposed to show cures, in all probability the patient subsequently has coughed up his empyema and has got well. I ought, perhaps, to have said earlier that, if the amount of pus is large, it should be let out slowly; because, when you have many pints of pus in the cavity of the chest, if you let it out quickly the heart swings back, and the patient may die suddenly.

I have already mentioned the question of the empyema being coughed up. Here we have a most interesting group of cases. There is no doubt whatever that a patient with an empyema can get perfectly well if the empyema is coughed up. I have seen over 30 such cases.

Once I deliberately left an empyema to be coughed up. It was the case of a friend of mine who, like some doctors—not all—was an extremely bad patient. He was an intelligent man of nearly 70, but he would constantly interfere with our treatment. One day we localized an empyema by physical signs. We did not needle him. We agreed that in a man of his temperament and age, with such a small empyema as we believed this to be, we should leave him alone, and let him cough it up. He did cough it up in a few days, and he lived for 10 years afterwards, and

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never knew he had had an empyema.

As a rule, however, it is wrong to leave the empyema to be coughed up. Nevertheless, empyemata are often coughed up, and, if they are, the cases may do very well. The best instances, outside empyemata, of pus being coughed up from the lung and the patient getting well, are cases of hepatic abscess.

Once a doctor in Hampstead asked me to see a man with him. He had had a telegram saying he was to go down to the docks to meet a patient invalidated home from India. He was a big man so wasted that he weighed only 5 st., coughing up 15 oz. of pus a day. My friend put him in an ambulance, and scarcely expected to get him home alive. We decided not to drain, because the patient was too ill to stand any operation. Moreover, by physical signs we could not tell definitely where the abscess was. When patients are coughing up pus, it is very difficult to localize its position, because they are constantly emptying the cavity. Well, that man got perfectly well, and when last heard of he was weighing 12 st. In another case we had occasion to X-ray the chest of an old man, and we found a curious line running obliquely from the diaphragm to the right bronchus. I told him that there was nothing to worry about in the X-ray picture, but that there was a curious line through the lung. And he told us that when he was 20, in India, he coughed up a hepatic abscess, and the X-rays clearly showed the scar of the track by which this happened.

A woman of 50 had pneumonia, then she had an empyema, which we failed to find by careful needling, but she coughed up a quantity of pus, and got perfectly well. Another man of the same age had the same condition with the same result. A boy in Great Ormond Street Hospital was seen by many doctors, all of whom failed to find his empyema; while in hospital under me he coughed it up, and got perfectly well. Then a man coughed up pus for months and got perfectly well. I might go on. I have notes of over 30 cases, all of which got perfectly well from coughing up pus. One man coughed up pus for five months after pneumonia but recovered completely.

I am bound to admit that not all patients with empyema who cough up pus get perfectly well. I have notes of four who have been coughing up pus and have yet not got well. But do not think that I am urging you to leave an empyema to be coughed up. I am only urging that, if it is being coughed up, it is often wise to give the patient a chance to get well in that way. It is extraordinarily

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difficult to find the cavity if the patient is coughing up pus, for the cavity is constantly being emptied. The best way is to give the patient a dose of morphia, because then you stop his coughing, and the pus collects and you can find it with a needle, and an attempt can be made to drain the empyema.

I remember the case of a schoolgirl, the foetor of whose breath from coughing up an empyema was overpowering. We needled her and could not find the empyema; the next night we gave her morphia, and on the following morning we found the pus quite easily.

There remain a few other points that I might deal with. In the first place, with regard to the rate at which the collection of the pus takes place, the largest empyema I ever saw opened contained 170 fl. oz., but this patient had malignant endocarditis. Sometimes the amount of pus is so large that, if you date the beginning of its exudation from the beginning of the pneumonia, you will find that the patient must have poured out pus at the rate of 3 or 4 oz. a day, and if it is dated from the time at which the temperature began to go up again after the crisis, it will be found that the rate of pouring out must have been 4 or 5 oz. a day.

The X-rays, so far as my experience goes, are of very little use. To begin with, most people with an empyema are ill at home in bed, and the X-rays cannot be taken to them. In the next place, you have a large area of pleuritic adhesion, and that alone will furnish an opaque shadow with the X-rays. The only help is that, possibly, the pus may cause the shadow to be a little darker in one place than in another.

Cases of double empyema are very rare. I can only recall four cases. They are very interesting from the point of view of how to deal with them, but generally they can be dealt with successfully. What the surgeon, with whom I have been associated, and

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myself have always done, has been to drain one empyema by free incision and at the same time to aspirate the other side of the chest, being guided as to the opening of the second empyema by how the lung is expanding on the side already drained. Generally, within a week or ten days, the patient can have the second empyema opened by incision. One man, aged about 40—and therefore not a good subject for operation for empyema—was operated on for double empyema, and I met him afterwards walking in the street at four miles an hour, and he said he could do five if necessary! The rarest thing I have ever seen is two on one side.

I found an empyema one day in a patient, and asked the help of a surgeon. He put his needle in where he thought it was, away from where I had found it, and got pus, and the pus was let out. Next day I heard of this, and said: "It is all very well, but I found the pus up above. Would you mind looking there?" And, sure enough, a second empyema was opened! That is the only example of two on the same side I have ever known.

A blood count will help you much in the diagnosis.

A division of empyemata, that is important clinically, is this: is the empyema merely a manifestation of a local condition in the lung (as, happily, most of them are), or is it a manifestation of a generalized infection? My experience is that, when part of it is a generalized infection, they do very badly.

Not long ago, I had a case of pulsating empyema. I will venture to say that we do not know why they pulsate. Any explanation given seems to me to make it difficult to understand why, if it holds good, there are not many more pulsating empyemata than there are. Fortunately, we were not led away in this instance into thinking it an aneurysm. The operation took place, and the patient did well.

If you know an empyema to be tuberculous, the patient is suffering from general tuberculosis, therefore I do not think it good policy to drain the chest;

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I should only aspirate it. And in the same way, if there is a pyopneumothorax, no good is done by opening it; it should only be aspirated to make the patient comfortable. Hæmorrhage sometimes occurs in empyema; I have twice known it fatal. Empyemata are sometimes complicated by peritonitis. That is not so surprising as it may seem at first, because both may be caused by the pneumococcus.

I was in the wards one day when a woman was admitted with empyema. We called in the assistant-surgeon, and, fortunately, as the case turned out, instead of giving the operation to the house-surgeon, he did it himself. Quantities of pus gushed out. Sure enough, it was an empyema with a suppurating pneumococcal peritonitis. The two communicated freely through the diaphragm. The woman got perfectly well.

There is only one remaining thing for me to say. If we may draw a moral from all these cases, I do want the moral to be this, so far as concerns empyemata and fluid generally in the chest: all fluid in the chest is bad, because it is hampering the lung, which is getting compressed and collapsed. That cannot remain so for ever. There comes a time when it will not re-expand. Therefore, your duty is to get the fluid—pus or not—out as soon as possible unless the amount is small. We learnt that during the war. I was attached to a hospital that had an unusually large proportion of cases of hæmothorax. If there is anything over half a pint of fluid in the chest, it is better out. No case of fluid in the chest is cured unless the lung re-expands properly afterwards, and the patient can breathe properly. Don't let cases go on until there are pints of fluid in the chest. Get it out quickly. You know what a pitiful thing Estlander's operation is. There are cases in which the surgeon decorticates the lung—strips off the lymph from it. He never ought to be asked to do either operation, because the pus never ought to be allowed to get to that amount at which either is necessary.

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If you cannot find the empyema, and yet from the temperature and leucocytosis and physical signs you think there is a fair probability that an empyema is there—don't go needling to find it between the diaphragm and the lung or between the lobes or the pericardium and pleura; but call a surgeon, and let him open the chest freely and look for the empyema, find it, and drain it. It follows from the importance of getting the lung to work quickly that you should order these patients, as soon as ever the fluid is out, to undertake breathing exercises. I had to do with a number of empyema cases in the war, and the breathing exercises which we started led to a freer discharge of the pus. If the chest is aspirated for clear fluid, bring in your breathing exercises as quickly as possible. There are several obvious exercises. Let the patient draw a deep breath while your hands are on the lower ribs. Be sure that he is not breathing deeply simply with the abdomen—see that he is really expanding the ribs. Another good thing is to make him lie on the sound side and draw a deep breath.

But the main thing—I want to repeat—is, in all these cases of fluid, to get the lung properly to work again as soon as possible.

On Fits, Epileptic and Others.

By ANTHONY FEILING, M.D., F.R.C.P.

*Physician to the Hospital for Epilepsy and Paralysis, Maida Vale ;
Physician to Outpatients the Metropolitan Hospital ;
Neurologist to the Air Ministry.*

EPILEPTIFORM convulsions are so common a symptom in medical practice that no apology is needed for referring to them. At the present time, when psychological methods in the investigation and treatment of disease are making such advances and have already included epilepsy in their grasp, it is perhaps appropriate, first, to consider briefly the various conditions in which these convulsions occur; and, secondly, to try to explain the basis of what must be considered as really a symptom and not a disease proper. In most text-books we find that, in classifying fits, it is usual to make the broad distinction between hysterical and epileptiform fits. Such a distinction is useful enough, but cannot be carried too far, and the dividing line between what may be termed an hysterical and what an epileptic manifestation is often only too narrow. There is nothing absolutely diagnostic in the convulsion or the mere loss of consciousness, or whatever the particular group of symptoms may be. A process of exclusion of the various possibilities is the only safe method of approach.

Since it may be admitted that a classification is useful, the following will be adopted*:

(1) Hysterical fits.

* This classification follows that given by Purves Stewart in *The Diagnosis of Nervous Diseases*, 1920.

(2) Epileptiform fits.

Epileptiform fits may be, in turn, classified ætiologically as follows:—

(a) Epilepsy proper (idiopathic epilepsy), in which we recognize three varieties—grand mal, petit mal, and post-epileptic states.

(b) Epileptiform fits associated with organic disease of the brain or meninges, and including herein Jacksonian epilepsy. Such conditions are injuries, tumours, abscess, meningitis, syphilis, and encephalitis.

(c) Epileptiform fits in G.P.I.

(d) Epileptiform fits occurring in certain states of toxæmia, such as uræmia, eclampsia, alcoholism, lead poisoning, or cocainism.

(e) Epileptiform fits in cardiovascular disease; for example, the fits of Stokes-Adams disease, when a state of heart-block is present, or in some cases of arterio-sclerosis.

(f) Infantile convulsions so-called, which are usually considered to be reflex and due to some peripheral irritation.

3. Tonic or cerebellar fits, which belong to an entirely different category.

We are not always fortunate enough to witness an example of the fits or attacks of which a patient complains. Hence, it is of particular importance to enquire very carefully into all the phenomena of the attack. Thus, the presence or not of an aura or warning should be established. An aura is properly a subjective somatic sensation, referred to the stomach or epigastrium commonly—sometimes to the head, sometimes to any or several of the limbs. It may occur in nearly all of the conditions mentioned above, and is no criterion of epilepsy proper as opposed to organic brain disease; indeed, an aura of some kind is not infrequently found in hysterical

fits.

On the other hand, sudden loss of consciousness, without any warning at all, is more suggestive of epilepsy than any of the other conditions mentioned.

The presence of a tonic stage, which may often be found without any subsequent clonic movements, is a point of importance upon which stress may be laid. The well-known symptoms of biting the tongue and involuntary passage of urine and fæces are no criterion for diagnosis, except as distinguishing between an hysterical and an epileptiform fit; they do not in any way indicate that the case is one of idiopathic epilepsy.

It will be found that a more or less severe headache generally follows an epileptiform fit, whether this be due to organic disease of the brain or ordinary epilepsy. Again, such an attack is commonly succeeded by sleep, sometimes prolonged for several hours, unless the patient be awakened.

The occurrence of fits during sleep forms an important point in diagnosis. Such attacks are usually called nocturnal epilepsy, but they may occur equally well if sleep takes place during the daytime. Their presence raises a strong presumption in favour of epilepsy proper.

It is not uncommon to get a history that the patient screams, throws himself about, and requires several people to hold him down either during or immediately after the period of unconsciousness. Such symptoms do not necessarily indicate that the case is wholly one of hysteria, for a genuine epileptic fit is sometimes followed by such hysterical manifestations; and, further, epileptiform and hysterical fits may alternate in the same patient. Great importance, therefore, attaches to the exact mode of onset in such cases; the presence or not of actual loss of consciousness; the existence of a tonic stage; the passage of

urine or fæces; the occurrence of the attacks during sleep, and so on. Sometimes, it is impossible to decide absolutely until an attack has been personally witnessed. Further difficulty is caused by the undoubted fact that genuine epileptic fits are not infrequently induced by psychological causes such as grief, worry, domestic anxieties, etc.

Attacks of petit mal are, on the whole, more easily diagnosed, particularly if one is so fortunate as to observe an example. But, here again, caution is necessary in coming too rapidly to a decision. Two cases which came under the writer's observation will serve to illustrate the care necessary to form a correct opinion, especially in persons of adult years.

CASE 1.—A labouring man, of 50, was seen at hospital, who complained of attacks of giddiness. When more closely analysed these proved to be brief attacks of unconsciousness exactly resembling petit mal. One actually occurred in the consulting room during the examination. His age and the absence of any previous epileptic symptoms, however, raised suspicions, which were later confirmed by the appearance of severe and continuous headache. Finally double optic neuritis and coma supervened. Death took place within six weeks of his first coming to hospital. At autopsy a large and rapidly growing tumour occupied both frontal lobes.

CASE 2.—A gentleman of 38 was seen, who was having "fits" at intervals of from 5 to 15 minutes throughout the day. These fits were nothing more than very brief attacks of unconsciousness, lasting about half a minute; they were exactly like an ordinary attack of petit mal. Examination showed that he was the subject of the Stokes-Adams syndrome, heart block with epileptiform attacks. Actually at the time of observation the ventricular pulse-rate varied between 16 and 20 per minute.

The subject of post-epileptic automatism has been brought before the notice of the public recently in certain criminal cases. It is too large a subject to discuss in any detail here, but it must be said that at least two facts must be clearly ascertained before one is justified in making this diagnosis. These are :—
(1) the unequivocal proof of previous attacks and, if possible, of an attack immediately preceding the

automatic state, and (2) a complete amnesia of the events occurring during the stage of automatism. Great care, again, is necessary to distinguish between the post-epileptic states and "fugues," which are commonly regarded as manifestations of hysteria.

The epileptiform fits associated with various organic diseases of the brain often differ in no essential respect from those of ordinary epilepsy. Typical attacks of so-called Jacksonian epilepsy may occur, and such are not, as a rule, confused with the ordinary epileptic fit. A fit which is ushered in merely by a feeling of numbness or tingling in one extremity, followed by loss of consciousness, should not be called Jacksonian epilepsy. This term should be confined to those cases showing the typical march of symptoms. Indeed, consciousness is not necessarily lost at all in every case. Another very important feature of true Jacksonian epilepsy is a temporary paralysis which affects the limb or part of the limb in which the abnormal sensation or convulsion started; this paralysis or paresis persists from an hour or two up to a whole day, and may be accompanied by a disturbance of sensation or by temporary exaggeration of the tendon reflexes, or both; or, when the leg is affected, by a temporary extensor plantar response. Apart from attacks of typical Jacksonian epilepsy, or of fits which are ushered by unusually localized or focal symptoms, there are certain features which should always raise the suspicion that organic disease of the brain is the basis of the symptoms.

The age of the patient is important. Cases of epilepsy do certainly arise in middle life, but it is always safer to be on one's guard and take especial pains to exclude, as far as possible, organic disease in a patient whose fits begin at or after middle life. Headache is another important symptom. When persisting unusually long after the attack, or occurring

independently of the attack, it frequently points to an organic basis, generally a tumour or a syphilitic lesion.

Focal symptoms alone, however, are not a definite criterion of local organic disease. Still less should they be the grounds for surgical interference. By focal symptoms, I do not mean objective signs of organic disease, such as a persistent extensor response or objective loss of sensation, but peculiarities of the attack such as, that they are ushered in by numbness or tingling in one limb, or that the clonic movements are said to be unilateral only. On the other hand, cases of local organic disease may manifest themselves first by attacks which exactly resemble ordinary epilepsy; only late in the case may the fits become more focal in type. Such a case is the following :—

CASE 3.—A young soldier was discharged from the Army in December, 1918, on account of epileptic fits, the first of which occurred in November, 1918. Later he was admitted to hospital, the diagnosis of epilepsy being confirmed by actual observation of the attacks. He was discharged but continued to attend as an out-patient. By July of the next year, 1919, the character of the fits had definitely altered and had become typically Jacksonian, the attack always beginning in the right hand. He subsequently developed physical signs of an organic lesion in the left cerebral cortex. In December, 1919, an operation was performed and a tumour (glioma) was found.

Such cases could easily be multiplied, and this one is only quoted as an example of an intracranial tumour manifesting itself first, and for some considerable period of time, by fits exactly resembling those of ordinary epilepsy.

Epileptiform convulsions in G.P.I. are a well-recognized symptom. They not infrequently occur very early in the course of the disease, occasionally forming the first symptom for which the patient comes under observation. Sometimes these convulsions may be strictly unilateral, and if then occurring before other symptoms have appeared, may raise many diagnostic difficulties, as the following case

will show :—

CASE 4.—A middle-aged Jew was brought to hospital in an unconscious condition, with violent clonic movements of the right arm only. The history was simply that he had had a fit a few hours before, since when he had remained unconscious with persistent and violent clonic movements of the right arm. Examination was negative except for the two facts that the pupils were small and did not react to light, and that both plantar responses were extensor. The movements of the right arm were continuous and could only be controlled by keeping the patient under chloroform. Although it was suspected that the case might possibly be one of G.P.I., the strictly focal character of the convulsions and their persistence led me to advise trephining over the motor centre for the right arm. No lesion was found and no benefit accrued, the convulsions returning as soon as the effects of the anæsthetic had passed away. Death occurred about 36 hours later, and subsequent microscopic examination of the brain showed the typical changes of general paralysis.

Equally well known are the epileptiform convulsions of uræmia and eclampsia. Apart from the other features of the conditions (albuminuria, vomiting, signs of pregnancy, etc.), they cannot be distinguished from ordinary epilepsy.

Reference has already been made to the attacks of unconsciousness occurring in cases of heart block, the Stokes-Adams syndrome, and a case has been quoted in which recurring attacks resembling petit mal were observed. More often the attacks resemble those of major epilepsy. They are seldom found except in cases of severe or complete heart block, and during the attacks the pulse will generally be found to have fallen as low as 20, or even less, per minute. Temporary periods of unconsciousness, often accompanied by convulsive muscular movements, may occur in patients the subjects of arterio-sclerosis, and are found both in those in whom the blood-pressure is low or in those in whom the pressure is unduly raised. Such attacks are occasionally followed by temporary monoplegia or hemiplegia, which clear up without any permanent after-effects—unless, of course, actual thrombosis or hæmorrhage in the brain should

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occur subsequently.

Tonic fits or cerebellar fits, as they were originally described by Hughlings Jackson, belong to a category by themselves and bear no relation to epilepsy proper.

Briefly, they are distinguished by periods of unconsciousness, with tonic rigidity of the whole body. This rigidity has been shown by Wilson to be analogous to the decerebrate rigidity of experimental animals, when the cerebral hemispheres have been cut off from the rest of the central nervous system by trans-sections through the mesencephalon. In its most characteristic form, the head and trunk are in a position of full extension, so that opisthotonos may be present ; the arms are fully extended and pronated, the legs fully extended with plantar flexion of the feet. Clonic movements do not occur.

Wilson has shown how, in some cases, this decerebrate attitude may persist for many hours at a time. Such lesions as cerebral tumours with hæmorrhage into the ventricles of the brain, tumours of the mesencephalon, and tuberculous meningitis with internal hydrocephalus, are quoted by Wilson as giving rise to the decerebrate posture with the occurrence of tonic fits. The reader should consult Wilson's paper and a clinical lecture by Sir James Purves Stewart for a fuller account of this interesting condition.

The following brief description of a case recently under the writer's care will serve as an illustration :—

CASE 5.—A girl, aged 10, was admitted to hospital on September 29, 1920, with the following history. In July, 1920, she began to suffer from headache and to lose all life and energy. In September she had a fit, the exact nature of which was not ascertained. On examination in hospital she showed : (1) dilated pupils with double optic neuritis ; (2) slight lateral nystagmus ; (3) unsteadiness in gait ; no definite motor paresis, no sensory loss. She complained of severe headache and pain in the back of the neck. From October 1 to 4th glycosuria was present ; Between October 18 and 23 she had several fits. These were preceded by a slight cry ; she became unconscious, the head and trunk were extended, on one occasion with the production of

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opisthotonos; the legs were fully extended; the arms were held to the side and extended, but it was not noticed whether they were pronated or not. The attack lasted only two to four minutes and recovery after was rapid. Vomiting usually followed the attack. It was considered that the diagnosis was one of cerebellar tumour, possibly of the vermis, in view of the fits which were recognized to be of the tonic or cerebellar type and of the extreme inco-ordination of gait which had developed. The operation of cerebellar decompression was attempted, but she died from respiratory failure before it could be completed. At a postmortem examination a tumour was found in the third ventricle, apparently growing from its ependymal wall; this had pressed upon and obstructed the Sylvian aqueduct, thus producing a condition of internal hydrocephalus and causing a physiological disconnection between the cerebrum and the rest of the nervous system, illustrating very well the production of the decerebrate attacks.

It will easily be understood from what has been said, that diagnosis should proceed by way of exclusion. However simple a case may appear at first sight, and however characteristic of ordinary epilepsy, care must always be taken to exclude, as far as possible, organic disease of the brain. That this is not always easy, all experienced observers will agree. The importance, therefore, of regarding the convulsions as a symptom and not as a disease *sui generis* may be emphasized, as Taylor has recently pointed out. There are certain points of positive diagnostic value in dealing with a case of supposedly ordinary epilepsy. Such are—apart from the features of the fit itself—the characteristic defect of memory, the family history, the association with other conditions such as Raynaud's disease or migraine, and, finally, to the experienced observer, the facies of the patient.

In dealing with the question of hysterical fits, again, it is not safe to assume that such are, of necessity, hysterical, because they appear to be induced by excitement, anxiety, or a domestic crisis, for genuine epileptic attacks are undoubtedly so induced. Nor must it be forgotten that the two

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conditions are not infrequently combined, and particularly may hysterical manifestations follow an epileptic fit. The two most important features of the attack upon which stress should be laid in reaching a differential diagnosis are (1) the presence or absence of a stage of tonic muscular contraction, however brief, and (2) actual loss of consciousness.

Consideration of the nature of epilepsy has recently received fresh study from the psychological interpretation of the disease put forward by Pierce Clark. The cause of the disease has always been in dispute, and hitherto has eluded certain discovery. On the one hand is the view that some organic disease of the brain is always present. This naturally receives support from the undoubted fact that many cases of epileptiform fits, indistinguishable from those of ordinary epilepsy, are eventually found to have their basis in some gross physical disease. Instances of such conditions have been quoted, and could easily be multiplied. But it is equally true that many more cases do not present such physical defects in the brain. Redlich has stated that 30 to 60 per cent. of the so-called idiopathic cases are found to have sclerosis of the cornu ammonis. Too much stress cannot be laid upon this finding, which may be a result even of the disease, or one mainly associated with senile or arterio-sclerotic changes. Some years ago, Russell endeavoured to show that a condition of cerebral anæmia was the cause of the convulsions. His view receives support from the analogy with migraine, as well as from comparison with the fits occurring in the Stokes-Adams syndrome, which must undoubtedly be ascribed to cerebral anæmia. Again, a sudden cessation of the pulse at the wrist has been noted at the onset of an epileptic fit, as Russell has pointed out. But, even granting that the cerebral anæmia is the actual exciting cause of the convulsion,

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we are still far from explaining why such a condition should arise. The frequent association in women of epileptic fits with the menstrual periods raises the question whether some biochemical or endocrine factor may be the cause. And, finally, even when a gross physical lesion exists, we are still ignorant of the exact mechanism of the production of the convulsion.

On the other hand, the psychological interpretation breaks away entirely from any physical hypothesis. Pierce Clark has carefully studied what he terms the "character make-up" in a series of epileptic patients, and considers that their temperament is characterized by egotism, poverty of ideas, and a general difficulty in adapting themselves to their social environment. Under emotional and physical stresses, the epileptic displays reactions such as fits, disturbances of temper, and various psychic disturbances. He regards the fit as essentially a regressive phenomenon, a flight from undue stress into unconsciousness. It may, therefore, be regarded as a protective phenomenon.

These studies of the psychology of epileptic patients are valuable, and their author rightly emphasizes the importance of early treatment and training. Whether his views of the nature of the epileptic fit will receive support is another question. At first sight, it is difficult to accept his explanation (by regression). One is tempted to think it more suited to the hysterical convulsion. As yet we cannot hold that the problem of epilepsy has been satisfactorily solved.

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The Significance of
Albuminuria.

By F. G. CHANDLER, M.A., M.D., M.R.C.P.

Physician to Out-patients, City of London Hospital for Diseases of the Chest ; Physician to the Weir Hospital, etc.

JUDGEMENT, said Hippocrates, is difficult and even experience fallacious; the passage of twenty-five centuries has served but to emphasize the truth of this. The schoolboy can appreciate the logical error of arguing that because all negroes are black men, therefore all black men are negroes; yet we, as medical men, have not infrequently made this sort of error and said that because disease of the urinary tract is accompanied by albuminuria, therefore albuminuria indicates disease of the urinary tract. Diabetes connotes glycosuria, but the converse is not true, and many are the mistakes of prognosis and treatment that have been made owing to this error. The same, too, applies to systolic murmurs over the heart area.

To emphasize what I believe to be an important truth, I will point my moral at the outset, and say that albuminuria *per se*, and as an isolated observation, has little significance.

So many men were rejected or invalided from the Army because they had albuminuria, that the matter became very serious and demanded strict investigation. This was put into the hands of Dr. Maclean. In 50,000 fit soldiers he found protein present in the urine in nearly 6 per cent. In most cases the amount was slight, but in over 2 per cent. there was decided albuminuria, while in nearly 2 per cent. casts were present as well. These men were taken at the end of

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a period of severe military training, they had shown no sign of inefficiency in any way. That the albuminuria was not due to the training was shown by the fact that its incidence in newly-joined recruits was even greater. These men went to the front, were subjected to hardships and exposure of all kinds, were in the area of trench nephritis, were, in short, put in the best position to contract nephritis, but they did not contract it, showing that, not only was the albuminuria no sign of ill-health but also that it did not predispose them to nephritis or any other illness.

Leube, as early as 1877, showed that 4 per cent. of healthy persons had albuminuria.

People are frequently precluded from favourable life assurance and youths debarred from admission to public services and certain appointments because they have albuminuria, but no other sign of any abnormality. One important public service has, however, accepted such boys for twenty-five years now, and their sick record is in no way unfavourable.

We know, therefore, that there exists an albuminuria which is in no sense an indication of ill-health or of any pathological condition whatsoever.

So we are confronted with a difficult problem, the solution of which is of the utmost importance, viz., how are we to distinguish the non-pathological from the pathological albuminuria? It is largely in an endeavour to help to solve this problem that this paper is written. At the same time its title suggests a broader field of enquiry, and I propose to make a brief survey of the conditions in which albuminuria occurs, and to show how its significance may be assessed in certain definitely pathological states. For my purpose, I have classified the different conditions associated with albuminuria into five groups:—

1. Those usually identified by ordinary routine examination.
2. Those presenting difficulty in diag-

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nosis. 3. Certain forms of nephritis. 4. Physiological albuminuria. 5. So-called functional albuminuria.

Under the first heading I include : acute nephritis, inflammatory conditions of the urinary tract, gonorrhœa, cystitis, pyelitis, etc.; stone, amyloid disease, leukaemia, and the albuminuria of feverish states. Most of these can be recognized by an ordinary routine examination (by which I mean a rapid, but complete, survey of the patient stripped to below the waist), and a careful enquiry into the history. I desire to say nothing further about them, except the last, the albuminuria we get in fever. When does this indicate nephritis and not merely cloudy swelling of the organ? If there is hæmaturia, with perhaps diminished quantity of urine and an increase of albumen, we may assume that there is nephritis, and can confirm this by the discovery of blood, granular and epithelial casts. Hyaline casts are of little significance, and often appear in normal urine. The nephritis that occurs during certain infections may easily be overlooked, so that it is important always to keep an eye on the urine. I have been struck by the number of cases I have seen following tonsillitis.

In my second group, those conditions which may present some difficulty in diagnosis, I place : polycystic disease, renal tuberculosis, bacillus coli infection of the urinary tract.

The first is rare, but may be recognized by the discovery of a cystic renal tumour, often bilateral, and by the coincident cardio-vascular changes.

The second condition, renal tuberculosis, is of importance, for extensive unilateral disease may exist with comparatively little impairment of the general health. The four cardinal signs, polyuria, pyuria, occasional hæmaturia and painful micturition, may be present to cause suspicion; if this suspicion is aroused, we must settle the matter definitely by

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the temperature chart, a bacteriological examination of the urine, including, perhaps, a guinea-pig injection, or recourse to the cystoscope.

Bacillus coli infection of the urinary tract is of even more importance and much more common. Since 1889, when Laruelle and Tavel demonstrated the pathogenicity of the colon bacillus outside the intestine, the question has attracted much study, and coli infection of the urinary tract is well known to occur in all degrees, from a simple coli bacilluria to a condition of pyelo-nephritis so severe that surgical removal of the kidney is demanded.

I am assuming that the more acute and severe conditions will not escape recognition; the pyuria, the temperature, and the rigors are sufficient evidence of a serious pathological condition. It is the cases of coli bacilluria that will cause more difficulty. The urine is probably acid, opalescent, and may show a trace of albumen. The opalescence does not disappear on the addition of acetic acid, showing that it is not due to phosphates, nor by the addition of potash, excluding, therefore, uric acid, and the bacilluric swirl can be seen. Sometimes the urine has a fishy odour. The albumen *per se* is of no significance. The bacilluria may not indicate present disease, but it means that the individual is a coli carrier, and is, in consequence, a potential danger to *himself*. The condition demands treatment, the best being to render the urine strongly alkaline, and to get the intestinal tract as healthy as possible.

Mr. Frank Kidd, in his recent book, *Common Infections of the Kidneys*, writes: "It should be much more widely known that curable surgical albuminurias are probably much more common than incurable medical albuminurias. A mild bacterial infection, a stricture, an enlarged prostate, a small stone in the kidney—to give only common instances

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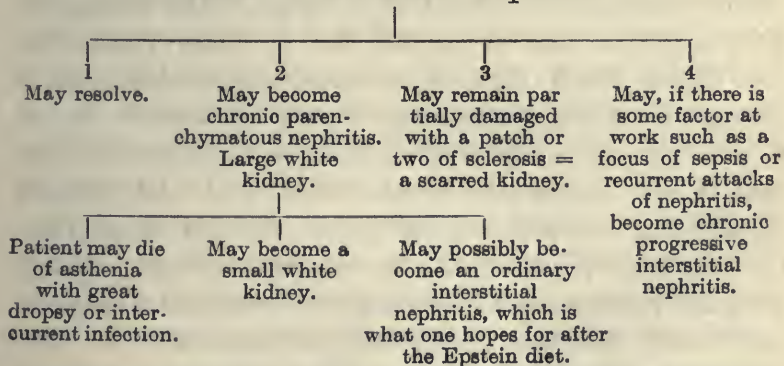
—will determine the presence of albumen
From failure to recognize this fact, men are unjustifiably rejected by insurance companies again and again; patients are put on long courses of milk diet, so that starvation aggravates their complaint.”

In my third group, I put certain forms of nephritis. The classification and nomenclature of these is still dreadfully confused, but we can subdivide the chronic cases into two main groups, though there is by no means always a clear demarcation between them.

1. Chronic parenchymatous nephritis, with œdema, much albumen, no cardio-vascular changes, retention of chlorides, no retention of urea and other nitrogenous bodies.

2. Chronic interstitial nephritis, with no œdema, comparatively little albumen, definite cardio-vascular changes, no retention of chlorides, but retention of urea, etc. In this, I include all types of interstitial nephritis, red or white, toxic, gouty or arterio-sclerotic, and a type which appears to be a sequel to acute or subacute nephritis. I have constructed the following scheme to show the probable sequence of events after an attack of acute or subacute nephritis, without laying any dogmatic stress upon it, to make my subsequent remarks clear.

Acute or sub-acute Nephritis.



There is no need to go into the diagnosis of chronic

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nephritis; but I would emphasize this, that no diagnosis of chronic interstitial nephritis can be unequivocal without a careful examination of the cardio-vascular system and measurement of the blood-pressure. This is omitted far too often in general practice, and I think it is because a convenient, portable blood-pressure apparatus, such as the Tyco's pattern, is not as widely known as it should be.

Under the fourth heading, I place physiological albuminuria. By this I mean the albuminuria which occurs after exercise, and appears to be a perfectly natural, healthy phenomenon. It has been shown many times that the urine of athletes after a race is loaded with albumen, *e.g.*, this has been demonstrated in the crews after the 'Varsity boatrace. This must be borne in mind if a man is examined after hard exercise, and a specimen should be tested after rest.

I now come to the vexed question of the fifth group, the so-called functional albuminuria. This has many synonyms—postural, adolescent, orthostatic, cyclic, lordotic, etc. Many are the theories of its causation. Some hold, like Dukes of Rugby and Armstrong of Wellington, that it occurs in the neurotic, weedy type of youth. Sir James Goodhart suggested that it is due to digestive disturbances; Sir Almroth Wright that the calcium metabolism is at fault, and the blood deficient in coagulating power. Dr. Hingston-Fox suggests that it is due to a blood dyscrasia; Dr. Ogier Ward that it is due to some local focus of sepsis. These causes may be true in certain cases; if so, there is a definite pathological condition, but this is not functional albuminuria, and the patient should be treated accordingly. At the beginning of this paper, I showed that an albuminuria existed with no concomitant pathological condition whatever, and this is the true functional albuminuria.

If this fact is established, then we ought to pass

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men presenting this phenomenon as first-class lives for life insurance and for the public services. We should not attempt to treat a condition which demands no treatment nor handicap their lives in any way.

How are we to diagnose functional albuminuria? Let us take a concrete case. A youth or young man comes to us to be examined for life insurance. We find albumen, perhaps quite a distinct cloud. What are we to do? We must base our investigation on the following table:—

1. Past history.
2. General condition and appearance.
3. Amount of protein present.
4. Blood-pressure (normal, 110 to 130).
5. Position of apex beat.
6. Presence or absence of œdema.
7. Casts (granular, epithelial or blood casts) and other abn. elements, such as pus, blood cells, spermatozoa, etc.
8. Urea concentration test (normal, 2 per cent. or over).
9. When necessary an exercise-tolerance test to measure the degree of myocardial insufficiency.

First, we must, by an enquiry into any symptoms, and the past history, and a rapid routine examination, exclude, as far as possible, most of the pathological conditions associated with albuminuria I have already mentioned. Then we must note the general condition. He seems perfectly well, there is no anæmia. There is no history of nephritis in the past. His heart is not hypertrophied, and functions well; that is, he has good exercise-tolerance. His blood-pressure is normal, the arteries are supple. We ask for another specimen passed first thing in the morning. If this is free from albumen, then, in view of the above findings, I think we are justified in saying that the albuminuria is not pathological, and in taking the man as a first-class life, either for insurance or for public services.

If there still is any doubt, then we should be obliged to have a microscopical examination of the urine for casts, etc., and possibly a kidney efficiency test performed, though as a rule this is unnecessary, Hyaline casts can be disregarded; epithelial, granular,

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and blood casts are pathological.

All of these things may be necessary before we can establish a diagnosis of functional albuminuria. There is no short cut to the diagnosis, but the issues at stake are so important that we cannot evade our responsibility, and, after all, in these days of well-equipped laboratories, there is no difficulty in getting special tests done. It is stated by some that functional albuminuria may be diagnosed from the fact that the urine passed on rising in the morning is free from albumen. This may be true in the absence of cardiovascular changes. Unless these are definitely absent, however, it is not diagnostic; for the albumen is often absent in the early morning specimen in definite cases of chronic interstitial nephritis, and may be absent in the daytime as well.*

The fact of morning absence, however, does, I think, definitely exclude inflammatory conditions of the urinary tract and parenchymatous nephritis.

Dr. Mackenzie Wallace claims that the globulin to albumen ratio is of value. Globulin may be easily demonstrated by the fact that it is precipitated by acetic acid in the cold. But Dr. Maclean found this test of no value in his army cases, and I have not found it helpful, either, in insurance or medical work.

Let us take another case. Let us suppose that our young man has had nephritis, and that he still has albuminuria, but looks and feels perfectly fit. We can hardly take him as a first-class life, but to what extent are we to load the policy and what is the prognosis? The probability is that the kidney is damaged; the lesion, however, may be only partial, the scarring finished, and the condition not progressive, a condition known as leaky kidney. To assess the

* Albumen may be intermittent, but urea test or casts may show involvement of kidney; and if urine tested on several occasions albumen will be found.

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exact degree of functional and anatomical derangement of the kidneys is not easy, if possible at all, but we can get a very good idea by making the investigations given in the above table.

If the general condition is good, and there is no anæmia (which must be judged, not by the colour of the skin, but by the palpebral conjunctiva); if the blood-pressure is normal; if the heart is not enlarged and the arteries are supple; if there are no epithelial, granular, or blood casts; if the urea concentration test is normal; then we can take the man on very favourable terms, though not as an absolutely first-class life. The prognosis is good, unless he develops other attacks of nephritis. He should be encouraged to take exercise, eat well, but not immoderately, and meat need not be forbidden. If, however, any of the above tests give unfavourable results, then is the prognosis unfavourable in direct proportion.

As the new urea-concentration test of Maclean is the best, simplest, and easiest test of renal efficiency, I will describe briefly the technique.

The test is as follows:—The patient empties his bladder, he is then given by the mouth 15 grammes of urea dissolved in 100 c.c. of water, flavoured with tincture of orange. One hour later, he passes his water, and this specimen is kept; an hour later he again empties his bladder, and this specimen also is kept. The percentage of urea in these specimens is estimated by the ordinary hypobromite method. In a normal individual the urine should contain from 2 to 4 per cent. of urea. If the percentage is below 2, it indicates impairment of renal function, and the lower the percentage the more serious the lesion. In actual practice, *samples* of these two specimens can be sent to a laboratory, for estimation of the percentage of urea, and at the same time examination can be made for any abnormal constituent of the urine.

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This test is no academic thing, it is of great practical value. One may find in a case of chronic nephritis an occasional absence of albumen, but pronounced cardiovascular changes and a very low urea concentration will indicate an imminent danger of uræmia.

Before going on to my last type I want to refer to the following very instructive case:—

A man of 29 had had definite albuminuria for thirteen years. On the whole his health was excellent; he was described as robust. In 1920, his urine was sent to a chemical pathologist who, on the grounds that the globulin part of the protein was in excess of the albumen, and that the diastase test was normal, and, in view of the general condition, gave a very favourable prognosis. In one month the man was dead of uræmia.

Now, if the investigations that I have mentioned had been carried out, and all the factors had been taken into consideration instead of only one or two (and those, in my opinion, very weak factors), this mistake would never have occurred.

There had been repeated attacks of tonsillitis, though nephritis had never been observed. In 1916, the blood-pressure was 160, and the urinary deposit contained some blood cells. By 1920, the blood-pressure had risen to 200 mm. Hg. The albuminuria was constant and showed no postural variation. A few days after the report I have mentioned above, an oculist reported albuminuric retinitis, but the man was still in apparent perfect health except for some impairment of vision. As I have already said, in a month he was dead of uræmia. Had the state of the cardio-vascular system and the blood cells in the urine been taken into account, a grave prognosis would have been given. If a urea-concentration test had been done, the imminence of uræmia would have been disclosed. The sword of Damocles would not have fallen unexpectedly.

Now for my last type, a man of 40 with slight albuminuria. Is this of the functional type or does

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it connote early chronic interstitial nephritis? I believe that the functional type does occur at this age, and yet this fact must not be forgotten that many of the worst early claims that life insurance companies have to meet are those from deaths by apoplexy; one of the common terminations of chronic nephritis. In fact, we get many proposers, classified by referees as uninsurable, who are perfectly healthy lives, and others passed as first class who die within a year, of apoplexy. How are we to judge of the significance of the albuminuria in such a case as this? Well, we again make exactly the same investigations as before, and here none can be omitted. Even an exercise-tolerance test must be done. If everything is favourable, we can regard the phenomenon of albuminuria very leniently; if, however, any factor is unfavourable, we are forced to the conclusion—either by the high blood-pressure, or the cardiac hypertrophy, or the presence of casts, etc., in the urine—that the albuminuria connotes chronic Bright's disease. On what, then, are we to base our prognosis? Perhaps we can arrive at this best by considering, how is the man with chronic interstitial nephritis going to die?

From apoplexy—therefore we must know the blood-pressure and the state of the arteries.

From heart failure—therefore we must know the state of the myocardium. We must note its response to exercise and its hypertrophy. Hypertrophy must be regarded in the light of modern knowledge as pathological and never compensatory.

From uræmia—therefore an estimation of the efficacy of renal function is essential, and the best and simplest test of this is the urea concentration test of Maclean.

Cardiology, Old and New : Some Contrasts.

By GORDON LAMBERT, B.A., M.D., B.C.

Assistant Physician, Royal Berks Hospital, Reading, etc.

CARDIOLOGY has made so many advances during the last two decades, that it is both interesting and profitable to "take stock" of the results achieved.

It is not difficult to realize that the main foundations on which the modern cardiology rests are :—

(1) The discovery of the nodal system, comprising the auriculo-ventricular bundle of Kent and His (1893), the sinu-auricular node of Keith and Flack (1907), and the auriculo-ventricular node of Tawara (1906).

(2) The application of the ink-polygraph by Sir James Mackenzie to the solution of problems, presented by the heart in health and disease, particularly cardiac irregularities.

Mechanism of the Heart's Action.—It is no longer possible to regard the controversy between the myogenists and neurogenists as an old conflict, which ended in a decisive victory for the myogenists. Gaskell's investigations led him to support the myogenists. His researches, however, were carried out on the hearts of reptiles, in which the fibrous auriculo-ventricular ring is not interposed as a barrier between the muscle fibres of the upper and lower chambers as in the mammalian heart. Luciani states that Paladino had shown, in 1876, muscle-fibres passing from auricle to ventricle in the human heart. Kent, in the course of his researches, which led to the discovery of the auriculo-ventricular bundle, found con-

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necting strands of "ordinary cardiac muscle" passing from auricle to ventricle in mammals. Apparently, these links were too slender to be accepted as the route of transmission; but the Kent-His bundle was hailed by myogenists as convincing evidence against the validity of the neurogenic theory.

The myogenists' sense of security was again disturbed in 1912, when Alexander Morison and the two Oppenheimers published independently their researches into the innervation of the sinu-auricular and auriculo-ventricular nodes.¹ Fig. 1 is a copy of Morison's diagram of the innervation of the sinu-auricular node in the pig. The nodal system may consist, according to accepted belief, of remains of the primitive cardiac tube, though Morison is sceptical about this belief; it may possess excitability superior to that of the rest of the heart, because it consists of less completely differentiated protoplasm; but it certainly cannot be regarded



FIG. 1.

as independent of the control of the nervous system. Prior to the researches just mentioned, Figs. 2 and 3, taken from Balfour's *Senile Heart* and from Brockbank's *Practical Handbook*, respectively, would have represented clearly the contrast between the neurogenic and myogenic creeds. Fig. 2 indicates the neurogenists' belief in the supreme importance of the cardiac ganglia. Fig. 3 gives a clear stage to the Kent-His bundle and the two nodes, on which the myogenists pinned their faith. A complete and up-to-date diagram should now indicate that both these nodes are supplied by the cardiac nerves. In other words, the heart does not enjoy a "nerveless automatism," in spite of its power of executing spontaneous, rhythmical contraction—it is a "bridled horse" (Wenckebach).

The Functional Anatomy of the Heart.—Complete dissection of the auriculo-ventricular bundle led

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Professor Keith to propound the following problem for himself: Why do the main abcesses of

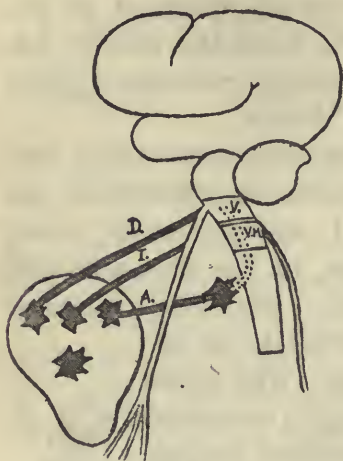


FIG. 2.

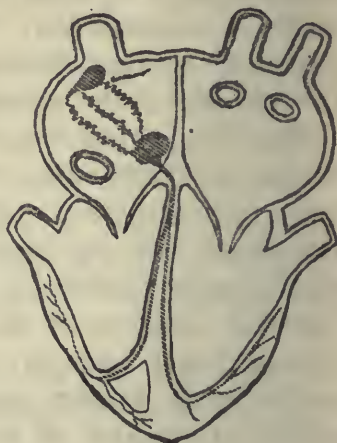


FIG. 3.

this bundle end in the apical region, so that, as Dr. Thomas Lewis has demonstrated, the contraction wave is first manifested there? Stated very briefly, his solution is this: The apex of the heart forms a movable fulcrum, from which the ventricular musculature can and does act. Both Keith and Mackenzie have shown us that the auriculo-ventricular ring is drawn downwards by the systole of the ventricles. Taking these facts in conjunction, we understand the object of the vortex of fibres at the apex of the heart. The fibres of the oblique external coat turn inwards at the vortex and form the internal coat, the musculi papillares, and the columnæ carneæ. Vaquez, Hering and others have concluded that the papillary muscles, supplied by the shorter strands of "the bundle," contract before any other portion of the heart. This may have an important bearing on certain cases of sudden death. When the musculi papillares undergo fatty degeneration, they may fail to maintain closure of the valvular orifices by their pull on the valves, exerted through the chordæ tendineæ. It is possible

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that degeneration of the shorter strands of "the bundle" may cause sudden death from blocking of the impulse to contraction, which should be transmitted to the muscoli papillares along the nodal system from the sinu-auricular node.

Between the spiral external and internal coats lies the circular middle coat. Keith points out that this arrangement conforms with Hunter's law, "No muscle acts alone: every muscle acts in co-operation with an antagonist." The circular coat of the heart, acting alone, would increase the length of the ventricles and diminish their lumen; but the circular coat is antagonized by the spiral coats. Fig. 4, taken from Mackenzie's *Diseases of the Heart*, shows the downward movement of the auriculo-ventricular ring during systole. Fig. 5, from Luciani's *Physiology*, shows the

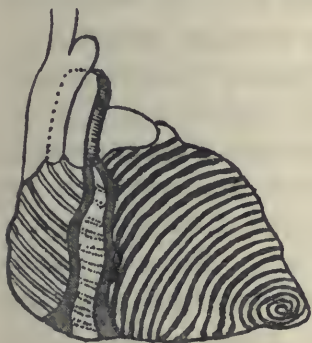


FIG. 4.



FIG. 5.

external coat of the heart and the apical vortex. Figs. 6 and 7 (page 48), from the late Professor Macalister's *Anatomy*, show the course of two spiral muscle bundles.

This modern view of the heart's contraction stands in striking contrast to the old conception of a peristaltic wave passing downwards from base to apex of the heart, spreading from fibre to fibre along their communicating branches.

The Significance of Cardiac Irregularities.—The new

light shed on the mechanism of the heart's action by the discoveries already mentioned, and by the clinical research of Mackenzie, Lewis, Morison and others, has enabled us to attain a more secure position in dealing with the diagnosis, prognosis and treatment of cardiac irregularities. Within the memory of nearly all of us lies the dark age, in which there was only one prognosis for all cardiac irregularities—the worst, and only one treatment—prolonged (and usually permanent) invalidism. Ignorance of their pathology was cloaked under imposing titles such as “delirium cordis,” “bradycardia,” “tremor cordis,” and the like.

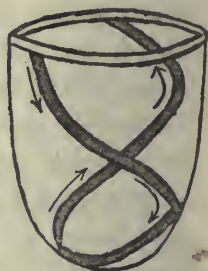


FIG. 6.

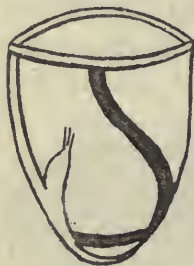


FIG. 7.

The most striking method of contrasting the old and the new cardiology is to show a few tracings taken with Sir James Mackenzie's ink-polygraph. The value of this instrument lies in the fact that it records simultaneously events in the auricle and ventricle by means of tracings taken from the jugular vein and radial artery respectively. In some cases, it is desirable to take in addition tracings from the apex-beat of the heart and the jugular vein. The radial tracings are precisely the same as those recorded by a sphygmograph.

In the jugular tracing three main waves can be distinguished :—

The *a. wave* is the “back kick” into the jugular vein, caused by the contraction of the auricle.

The *c. wave* is caused by the pulse-wave in the carotid artery being transmitted through the jugular vein to the surface.

The *v. wave* is due to the storing of blood in

the auricle during ventricular systole, which causes a rise in the tracing preceding the *a.* wave.

In reading any tracing, the first step is to localize the *c.* waves. When the *c.* waves have been localized, the *a.* and *v.* waves are recognized by the order of their occurrence.

Normal Tracing.—The first tracing, Fig. 8, illustrates all these points. The patient complained of dyspnœa and some discomfort over the præcordium on exertion. The heart's apex-beat was not displaced,

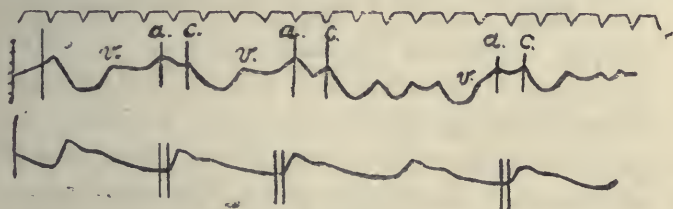


FIG. 8.

the heart-sounds were closed, and the differential stethoscope gave a good reading. The polygraph tracing was made, a blood-count was taken, and the blood-pressure was estimated. The blood-count showed a slight secondary anæmia, probably due to digestive disturbance. The polygraph showed regular venous and arterial tracings, and the *a.*—*c.* intervals, which were measured in many beats, did not exceed $\frac{1}{5}$ sec. The blood-pressure was quite satisfactory. It was a sound inference, therefore, that the myocardium was not degenerated, and that was the point requiring investigation.

Sinus Arrhythmia (Respiratory Irregularity, or Youthful Type of Irregularity).—This form of irregularity is commonest in young children, but it is not confined to the age of childhood. One often finds it present in nervous young adults, especially women, and it is easily detected with the stethoscope. The facts essential to clear understanding of the nature

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of the irregularity are these:—

(1) It has a supra-cardiac origin, and, therefore, the irregularity in the venous and radial tracings exactly correspond. Stimuli arise in an irregular rhythm from the sinu-auricular node, not from any lower part of the nodal system, as in the case of extra-systoles. The irregularity is due to variation in length of the diastolic period.

(2) It is frequently associated in schoolboys and schoolgirls with syncopal attacks. These "fainting attacks" cannot be directly ascribed to it; they are probably due to concomitant vaso-motor disturbance. Needless (and harmful) restrictions should no longer be imposed on patients presenting the signs of sinus arrhythmia, which is now recognized to be a harmless condition.

(3) Its occurrence with the slow pulse after fevers is welcomed by Sir James Mackenzie as a good sign, indicating that the heart-muscle has escaped infection and has retained its vigour and responsiveness to stimuli. These stimuli are reflex nervous stimuli, in cases of sinus arrhythmia, conveyed to the heart through the sinu-auricular node. To quote Sutherland, "The vagal centre in infancy and childhood is not a 'going concern,' but is subject to various disturbing influences from within and without, which easily upset the regularity of its action. Hence comes the youthful type of irregularity."²

The irregularity of the pulse in normal children during sleep is well known.

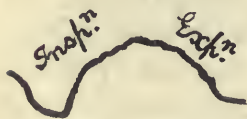


FIG. 9.

Moreover, during deep respiration the pulse in children shows decided variation, quickening during inspiration and slowing during expiration. Fig. 9. was taken from a boy, aged 11 years, without any symptoms, while

he was breathing slowly and deeply at my request. One can obtain the same definite variations in tracings from nervous young adults.

Sinus arrhythmia is the cause of the irregular pulse of tuberculous meningitis and cerebral abscess in children. Fig. 10 (after



FIG. 10.

Sutherland) shows cardio-respiratory irregularity in the pulse of a boy, aged six years, suffering from cerebral abscess.

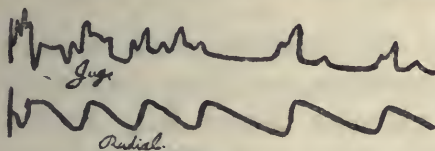


FIG. 11.

Fig. 11 (after Sutherland) is a typical sinus arrhythmia tracing (jugular and radial).

Extra-systoles (or Premature Beats) occur at a later period of life than sinus arrhythmia. During the war we became very familiar with them in dealing with "D.A.H." (disordered action of the heart) cases. But they do not occur only in young adults; their frequent association with the senile heart has become proverbial.

There is abundant evidence that Laennec (*Treatise on Auscultation*, 1827) and his immediate successors were well acquainted with extra-systoles. Laennec distinguished "two kinds of intermissions, the one *real*, consisting in an actual suspension of the heart's action, the other *false*, depending on contractions so feeble as to be imperceptible, or almost imperceptible," at the wrist. Balfour (*The Senile Heart*, 1894) knew that "false intermissions" (extra-systoles) could be recognized by counting the heart-beats and the pulse separately. The older cardiologists, however, had not the means of interpreting extra-systoles correctly. They belonged to the early neurogenic school, and they naturally attributed both "real intermissions" (heart-block) and "false intermissions" (extra-systoles) to inhibitory action of the vagus,

the inhibitory force being greater in heart-block than in extra-systoles.

The modern theory of the origin of extra-systoles is that they are premature beats, the stimuli for which arise not in the sinu-auricular node, but in some other part of the embryonic heart-tissue, which lies in the auricles, or in the ventricles, or at the auriculo-ventricular node. Accordingly, three varieties of extra-systoles are described—auricular, ventricular, and nodal.

As regards prognosis, the accepted view is that extra-systoles are quite harmless, and that even when they occur in cases of valvular disease they do not render the outlook more grave. Lewis, however, suspects that time will prove the incidence of grave irregularities of the heart to be greater in cases showing extra-systoles than in those with regular cardiac action.³

Fig. 12 is a tracing taken from a man, aged 23 years, who returned from military service with good general health and distinctly improved physique. On examining his heart, one found

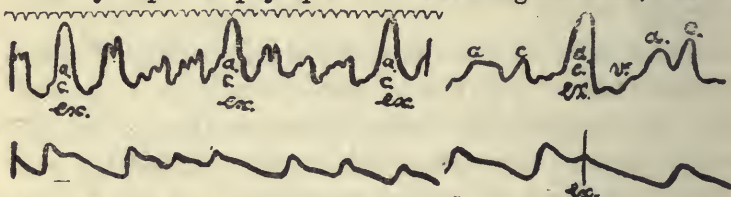


FIG. 12.

that the apex beat was not displaced, and the sounds were closed; but there were frequent extra-systoles—that is, premature beats audible with the stethoscope but not producing corresponding radial pulse beats. The polygraph tracing shows extra-systoles of ventricular origin—large waves composed of the *c*. wave of the extra-systole superimposed on the *a*. wave arising from the rhythmic contraction of the auricles. Although the extra-systoles did not in this case produce a palpable pulse-beat, the radial tracing shows slight but distinct waves corresponding to some of the extra-systoles.

Figs. 13 and 14 are tracings taken from a case of malignant endocarditis showing auricular extra-systoles.

The patient had lesions of old standing of the mitral and aortic

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valves. During the attack of malignant endocarditis the pulse became intermittent. The arrhythmia, owing to the murmurs and extrasystoles, was naturally somewhat puzzling. One was able,



FIG. 13.

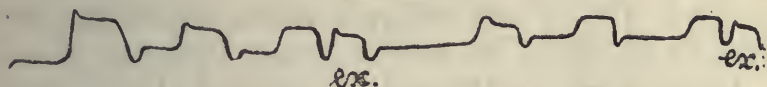


FIG. 14.

however, to give a provisional opinion in favour of extra-systoles rather than of heart-block. The tracing from the apex and radial shows the extra-systoles very clearly, following abruptly after normal systoles. Each extra-systole is followed by a long pause. It shows, also, another important point. The apex-beat was displaced outwards considerably. The tracing was taken directly over the apex-beat, and its plateau-like form shows that it is a *positive* cardiogram, that is, one produced by the left ventricle. If dilatation had caused the apex-beat to be formed by the right ventricle, the cardiogram would have been of the *negative* type, with its characteristic abrupt rise and fall. Turning to the tracing of the jugular and radial pulses, we find that each extra-systole is represented in the venous pulse by two small waves (*a'*, *c'*)—the extra-systoles were auricular in origin. In a case with "closed" heart-sounds, recognition of auricular extra-systoles can be usually made with the stethoscope.

Heart-block.—The term "heart-block" is applied to a condition, in which obstruction exists to the passage of the stimulus to contraction from auricle to ventricle along the auriculo-ventricular bundle. In all cases, therefore, a lesion of this tract is present. It may be limited to "the bundle," but more often a widespread implication of the myocardium is present. The lesion may be temporary or permanent, and Dr. Claude Wilson's classification of heart-block cases is as follows:—

- | | | | |
|--------------------------|---|---|------------|
| (a) Permanent—Syphilitic | - | - | } changes. |
| Chronic rheumatic | - | - | |
| Senile sclerotic | - | - | |

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(b) Temporary—Rheumatic	-	-	} fevers.
Scarlet	-	-	
Pneumonia	-	-	
Diphtheria	-	-	
Influenza	-	-	

Complete heart-block is a clinical curiosity; no impulses pass from auricle to ventricle, and the ventricles take on their own independent rate—30 or less per minute. Before this independence is established, the attacks known as the Stokes-Adams syndrome occur.

Lesser degrees of heart-block (2 : 1, 3 : 1) are more common. *It is important, however, to realize that damage to "the bundle" may cause merely slight prolongation of the a.—c. interval, which is normally $\frac{1}{2}$ second. This prolongation indicates damage to "the bundle," but it implies the possibility of widespread degeneration of the myocardium.*

Fig. 15 is a tracing taken from a woman, aged 35 years; she had influenza during the epidemic of 1918. When I first saw her in June, 1919, she complained of pain over the præcordium, which extended down the left arm to the fingers. There were no notable physical signs in the heart; but the polygraph revealed prolonged a.—c. intervals. After rest in bed and treatment, polygraph

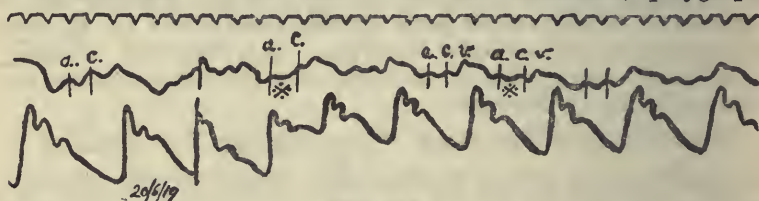


FIG. 15.

tracings were again taken, one of which is shown in Fig. 16. These tracings showed normal a.—c. intervals. The case seems to fall into the "temporary" group of Wilson's classification.

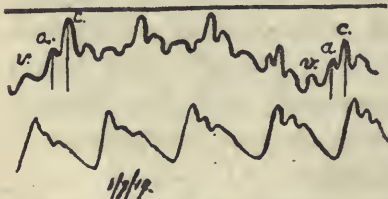


FIG. 16.

Hering performed (in 1905) experimental section of the auriculo-ventricular bundle in ten dogs' hearts.

Fig. 17 is a copy of one of his tracings showing the heart-block resulting from

division of "the bundle." An account of his investigations and conclusions will be found in Luciani's *Physiology*, Vol. I.

Fig. 18, taken from Price's *Diseases of the Heart*, shows a 3:1 heart-block. A c.

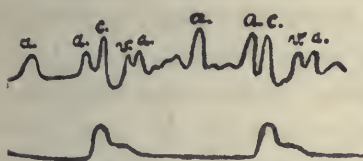


FIG. 18.

wave, due to ventricular contraction, occurs only after every third *a*. wave of auricular contraction in the jugular tracing—that is, the auricle contracts three times and the ventricle once during a given period.

In the senile heart, a slow and regular pulse, alternating with a quicker rate, is highly suggestive of heart-block. A very graphic account of a case of heart-block is given in Balfour's *Senile Heart* (pp. 109–113). The pulse-rate rose from 30 to 80 during exertion and became very irregular. The Stokes-Adams syndrome was present in the early stages. Balfour classified the case as one of "Senile Bradycardia," and attributed the slowness of the pulse to inhibitory action of the vagus. The older cardiologists, to whom the Kent-His bundle was unknown, adduced the pathogenesis of heart-block from certain rare surgical cases, in which damage to the cervical spine resulted in decided slowing of the pulse, due to inhibitory impulses conveyed to the heart by the vagus nerve. We now know that this explanation was incorrect as applied to medical cases.

Auricular Fibrillation and Heart-failure.—It is convenient to consider auricular fibrillation and heart-failure together, because they are so closely associated, especially in cases of mitral stenosis with failure of compensation. Auricular fibrillation is the "pulsus irregularis perpetuus," which Hering described in 1902

as commonly present in cardiac failure. Many years before that date it was grouped under the heading "Delirium Cordis," a term loosely applied to any marked irregularity of the heart's action. Balfour recognized that "Delirium Cordis" was "common enough" in mitral stenosis. Osler in 1897 assigned "Delirium Cordis" as a cause of sudden death in typhoid fever.⁴ He described it as "extreme irregularity and finally failure of action." Lewis in 1909 (and Cushny and Edwards in 1906) produced auricular fibrillation experimentally in dogs' hearts.

"A normal and a fibrillating auricle may be compared to a surface of water, disturbed in one case by billows, in the other by a downpour of rain—co-ordinate and inco-ordinate contractions. When an auricle fibrillates, the ventricle beats at double or treble the ordinary rate, and irregularly, because impulses issue haphazard from the auricular turmoil" (Lewis).⁵

Emanuel has pointed out that a patient may work for years with a continuously irregular heart, and that in some cases paroxysmal fibrillation occurs (with irregular pulse) just as paroxysmal tachycardia occurs (with regular pulse).⁶ The magic effect of digitalis in auricular fibrillation is due to the production of heart-block and thus to slowing of the ventricle. The condition can be demonstrated with Mackenzie's ink-polygraph, and even more strikingly with the electro-cardiograph. In electro-

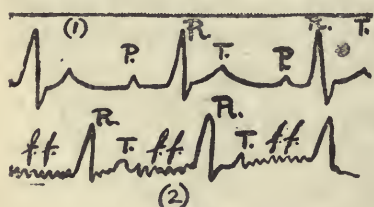


FIG. 19.

Fig. 19 (1) is an electrocardiogram from a normal heart. Fig. 19 (2) is an

electro-cardiogram from a case of auricular fibrillation; the wave *P* is replaced by oscillations *f, f* derived from

the fibrillating auricle. Both tracings are taken from Lewis's paper, to which reference has been made. Fig. 20, taken from Price's *Diseases of the Heart*, shows the multiple undulations in the venous tracing (polygraph), caused by the fibrillating auricle.

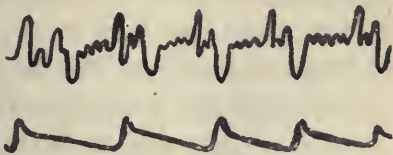


FIG. 20.

The tracing shown in Fig. 21 was taken from a case of auricular fibrillation.

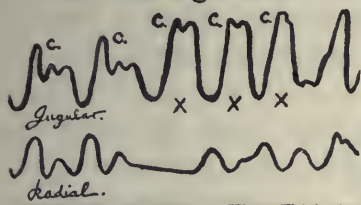


FIG. 21.

The patient, a man aged 51 years, had influenza during the epidemic of 1918, and his symptoms date from that illness. He states that he has not had any other illness in his life. His condition had improved under digitalis, but the irregularity

was still well marked. The ventricular form of venous pulse, signifying absence of auricular activity, is evident at X.

Emanuel classifies auricular fibrillation cases into two groups:—

(1) *Rheumatic Group*.—The patients are young; average age in 45 cases was 34 years. Valvular disease may or may not be present; if present, mitral stenosis is by far the most common.

(2) *Non-rheumatic Group*.—The patients are past middle age; average age in 22 case was 58 years. In this group the condition known as myocardial degeneration, cardio-sclerosis, or senile heart is present. It may be associated with arterio-sclerosis, granular kidney, aneurysm, etc.

Cardiac Failure.—The researches, past and future, into the pathology, ætiology, and clinical picture of auricular fibrillation should have an important influence on our conceptions of cardiac failure. In our student days, the teaching of cardiac failure was based on the assumption that the events occurring in the heart could be accurately explained by the laws of Physics. Hence arose the graphic descriptions of the gradual

accumulation of blood in the cardiac chambers and the phenomena attributed to "back pressure." Great stress was laid on the law of Roy and Adami:—"The strain upon the walls of a sphere or spheroid increases with its circumference, and, therefore, the resistance to the contraction of the heart walls is increased, whenever it becomes dilated." But the attempts to explain vital phenomena by the rigid laws of Physics afforded but an inadequate cloak for our ignorance. We know that even a normal healthy ventricle does not invariably discharge its full contents into the aorta; but its distension is kept within limits, because it has the power of executing contractions, of which the force is proportioned to the degree of its distension. A heart enfeebled by disease, however, loses this property in greater or lesser degree.

What, then, is the essential difference between a normal auricle and a fibrillating auricle? The degree of distension would seem to be a far less important factor than the condition of the muscle of the auricle.

Space hardly permits one to touch on the new conceptions of heart failure, which we owe to Mackenzie. One cardinal fact, however, on which he lays due emphasis, should be borne in mind:—

When the body is at rest, the heart uses only a limited portion of its power. When the body is active, the heart calls on its reserve force."

An obvious practical application of this axiom is this, that we can classify cases of heart-failure broadly into two groups:—

(a) Those in which exertion of variable degree in different cases exhausts the reserve force.

(b) Those in which the cardiac power is reduced so greatly that it cannot meet adequately even the demands of the body at rest.

The "effort syndrome" tests have for their object

the estimation of the degree of reduction of the reserve force. The blood-pressure-exercise test⁸ has the same object.

Pulsus Alternans.—The question of cardiac power brings one to a very important sign, which should be very carefully looked for in certain cases because its significance is almost invariably very grave, and it is easily missed. Time does not permit the very full consideration of this sign, which its importance merits. It is known in Hering's classification as "Pulsus Alternans," and in Mackenzie's classification as "Irregularity due to Depression of Contractility of Ventricles," a name indicating its pathology. When the muscular power of the ventricles is diminished by disease, a loss of contractility results. In consequence, the refractory period is lengthened, and the ventricle takes a longer time to recover from the exhaustion induced by a contraction. If, then, stimuli to contraction issue from the sinu-auricular node at the normal rate, each alternate contraction is weak, because the ventricle has not had time to recover fully from the preceding contraction.

Fig. 22 shows a radial tracing of pulsus alternans



FIG. 22.

above and another of extra-systoles below. The chief points of distinction are these:—When an extra-systole occurs regularly as every second beat, the pause after each extra-systole is prolonged; in pulsus alternans, the pause between any two beats is usually of the same duration, but if it varies at all, it is shortened, not lengthened. Thus, with extra-systoles we have a coupling of beats, hence the term

“pulsus bigeminus”; with pulsus alternans the rhythm is continuously regular—no coupling of beats. Although it may occur in paroxysmal tachycardia (as auricular flutter), indicating temporary exhaustion of the ventricular muscle, it is far more commonly the result of degenerative changes in the heart-muscle producing exhaustion. It is an important fact that pulsus alternans is *continuously present in very rare cases only*. Usually it occurs from time to time and is present for a few beats. As regards the probable duration of life after the first appearance of pulsus alternans, Lewis fixes it at “a few months, at most a few years.”

Assessment of the Value of Heart Murmurs.—During the last five years the pendulum of opinion on this subject has oscillated freely, and a good deal of confusion has arisen in consequence. It was natural that medical opinion should be greatly influenced by urgent national needs during the war. Cardiologists laid down the axiom—that a heart should not be condemned as inefficient for military service on the ground of any single physical sign, including murmurs. This is a self-evident fact, and the rule applies equally in civil practice, for no one would base his estimate of the efficiency of the heart in any case of valvular disease solely on the result of auscultation. Unfortunately, a very loose and distorted interpretation of this axiom soon became prevalent. One frequently heard it stated that “murmurs did not matter,” that “a man with valvular disease was just as fit as anyone else for military service, provided compensation of the lesion was good.” But these are very inaccurate statements. It has been common knowledge for many years past that, when a heart is damaged by infectious febrile disease, notably rheumatic fever, the lesion is not limited to the endocardium. In other words, we have to deal with

myocarditis, and, it may be, pericarditis as well as endocarditis. Poynton, among others, has laid special stress on this "carditis" affecting all the tissues of the heart.

Few will dispute that a heart, which has once been damaged in this way, is never likely to become capable of competing on equal terms with a heart which has escaped infection. Moreover, there is good reason for attributing heart-strain in young soldiers to the effects of toxins on the heart-muscle rather than to physical over-exertion. It would appear that, in most cases, toxæmia is the efficient cause; that physical strain and nervous disturbance may be determining causes. Obviously, any toxæmia, incurred in military or civil life, is likely to have a more deleterious effect on a heart already damaged than on a heart previously sound. The conclusion is forced upon us that we are certainly not justified in dismissing as of no prognostic importance murmurs indicative of valvular lesions. No allusion is intended to "cardio-respiratory" and "hæmic" murmurs. The war having ended, it behoves us to regain a more dispassionate attitude towards cases of organic disease of the heart.

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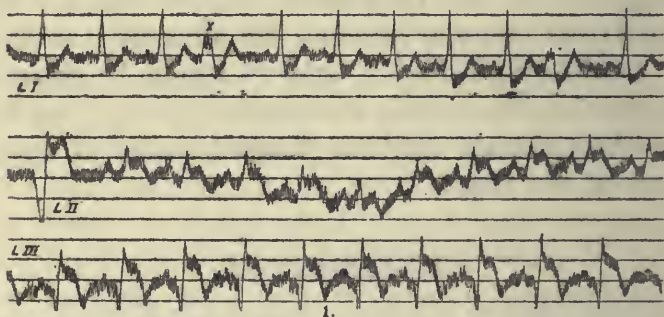
- ¹ Morison : *Sensory and Motor Disorders of the Heart*, pp. 45 *et seq.*
- ² Sutherland : *The Heart in Early Life*, p. 26.
- ³ Lewis : *Clinical Disorders of the Heart Beat*, pp. 54, 55.
- ⁴ Osler : *Principles and Practice of Medicine* (1897 edition), p. 35.
- ⁵ Lewis : *British Medical Journal*, January 13, 1912.
- ⁶ Emanuel : *British Medical Journal*, January, 1912.
- ⁷ Mackenzie : *Principles of Diagnosis and Treatment in Heart Affections*, pp. 39 *et seq.*
- ⁸ Strickland Goodall : *British Medical Journal*, October 14, 1916, and Lambert : *British Medical Journal*, October 5, 1918.

The Cardiograph in Diagnosis and Prognosis.

By I. HARRIS, M.D.

Hon. Physician, Cardiographic Department, Northern Hospital, Liverpool.

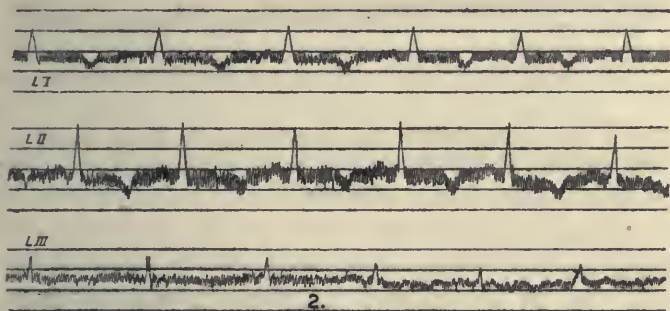
THERE still exists a considerable difference of opinion as regards the value of the electro-cardiograph as a means of elucidating pathological conditions of the heart. One usually hears two extreme views pronounced in regard to this matter. There are some who look upon the cardiograph as a useless toy, without any merit or value. It can be safely said that those who are



No. 1.—*This cardiogram has been taken from a patient who showed but few physical signs. In fact, it was doubtful whether the condition was primarily cardiac. The electro-cardiogram made it clear that it was a case of a serious condition of the myocardium. An extremely bad prognosis was given, a prediction which unfortunately came true within a short time. Long systole, short diastole, inversion of T in L II and a peculiar feature marked X.*

holding these views have never taken the trouble to acquaint themselves with the results already achieved by cardiography. On the other extreme are the enthusiasts who consider that the electro-

cardiograph has entirely revolutionized the science of heart disease. Listening to these, one would imagine that it is only necessary to take a cardiograph and the whole pathology of the case stands revealed before us. Unfortunately, this is not so. There is no such short cut to a scientific diagnosis. A true insight into the pathological condition of the

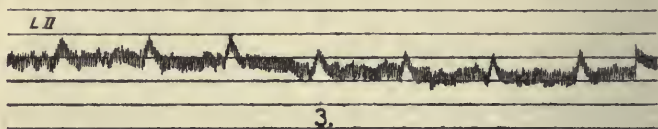


No. 2.—*This cardiogram has been taken from a patient who did not show any other physical signs excepting an enlarged heart. No murmur, no temperature, no enlarged spleen. There was nothing in the physical signs which led one to believe that the case would soon terminate fatally. The cardiogram revealed a grave condition of myocarditis, with an extremely grave prognosis. The patient died a few weeks afterwards. Inversion of T in L II.*

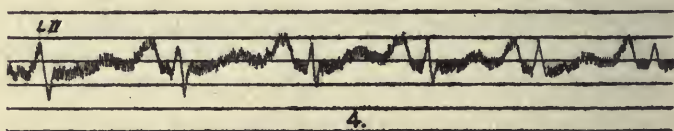
heart, as of any other organ, can only be obtained by patient and laborious investigation, and by the use of all available methods. An electro-cardiograph is an extremely useful instrument if too much is not expected from it. By means of this instrument, we are in a position to diagnose a great number of affections of the myocardium, which otherwise could not have been diagnosed. Medicine is admittedly not an exact science. So much in it is personal, illusive, unverifiable. It is, therefore, an immense gain to have an instrument by means of which one is often able to obtain something definite, certain, something which one is able to fix, see, measure.

THE PRACTITIONER

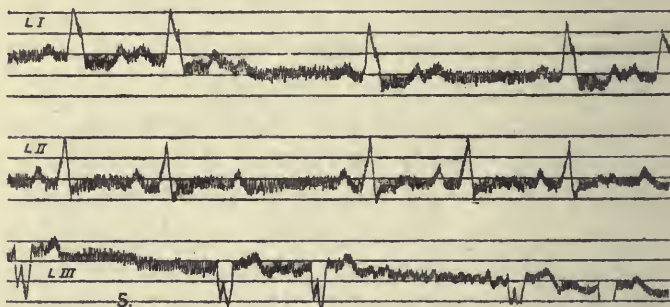
The following are a few illustrations taken out of a collection of 2,000 odd cardiograms which I have obtained during the last six years; the greatest majority have been obtained at the Northern Hospital, some from private practice. Again, a number of the cardiograms have been taken from patients who have



No. 3.—*A case of syphilitic degeneration of the heart-muscle. The indefinite outline, in my experience, is very characteristic of specific disease.*



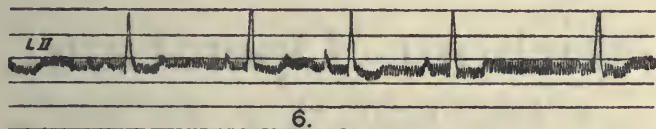
No. 4.—*A case of mitral stenosis. P. (auricular wave) is over-developed and bifurcated, also preponderance of the right ventricle—a very helpful sign in doubtful diagnosis.*



No. 5.—*A case of Stokes-Adams disease, not only is the bundle here affected, but also there is evidence of myocardial degeneration. This type shows the Stokes-Adams syndrome; the trouble, obviously, is not due to disease of bundle alone, but also to degeneration of the heart muscle. It is a totally different disease from ordinary heart block, and ought to be treated on different lines.*

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been in charge of the physicians of the Northern Hospital, and some from the Heart Clinic under my charge in the hospital.



No. 6.—*A sign of digitalis poisoning. The drug ought to be discontinued when this sign appears. The sign remains for two to three weeks after the discontinuation of the drug.*

Apart from such well-known affections as auricular fibrillation, heart-block, extra-systole, there are many other cases in which only definite diagnosis could be made by means of the electro-cardiograph. Preponderance of a ventricle, and inverted T, or P, a prolongation of P-R interval, they are useful signs which often clinch a diagnosis.

Treatment of Piles without Operation.

By JAMES EADIE, F.R.C.S., M.B., Ch.B.

London.

A MODE of curing (I use the word advisedly) piles without operation, which receives far less attention from the medical profession than it merits, is the so-called injection method—the interstitial injection of each individual pile with some fluid such as carbolic acid. This neglect is perhaps the more strange when one takes into account the large number of sufferers from hæmorrhoids in the profession who have themselves been successfully treated by this means. The technique is simple, and can be carried out in one's own consulting room; the results are immediate and excellent; an anæsthetic is not needed; the patient does not require to lay up, but can get about his ordinary vocation.

The method was, I believe, first practised on any large scale in this country by Mr. Dudley d'A. Wright over 30 years ago, and it is to him I am indebted for introducing it to my notice in 1903. At that time, if referred to at all by medical teachers it was mentioned merely to be condemned as inefficacious or dangerous or both; and I confess I was biassed against the treatment when Mr. Wright first demonstrated its technique to me. I, however, very soon learnt that it is neither inefficacious nor dangerous.

During the last 18 years I have given, in hospital and private practice, many thousands of injections, and am convinced that when properly done the results compare favourably with the best of other

treatments, and so far I have never experienced any of the dangerous effects, such as septic thrombosis, which it is surmised should occur, but do not.

It is, in my opinion, the treatment of election for hæmorrhoids, and can be practised in all cases in which the rectal speculum can be introduced. It is especially valuable where operation is contra-indicated.

I would relegate to operation only those few cases in which for some reason the speculum cannot be used without a general anæsthetic, or when an anæsthetic has to be given for some intercurrent condition, the piles can be removed at the same time.

The technique adopted is briefly as follows: The patient lies on his left side with the thighs fully flexed on a firm couch or table, preferably at least 2 ft. 6 in. high. The perineum is exposed to a good light. On the first occasion of seeing the patient one observes carefully for prolapse, sentinel pile, fissure, etc.; and besides examining the rectum digitally *re* stricture, prostatic enlargement, etc., it is well to make a general examination to elicit, if possible, the cause of the piles. The latter are demonstrated in the lumen of a warmed and vaselined proctoscope introduced into the anal canal, and each pile is then punctured by the needle of a syringe, and 3 to 5 minims of the injection fluid instilled. (The fluid I use is acid. carbol. 10 parts, hamamelis 10 parts, aqua dest. 80 parts.) Three piles may be treated at one time. The anal canal is then swabbed dry of any injection fluid that may have escaped into it. The speculum is entirely withdrawn. The perineum is swabbed free of lubricant. The patient gets up and dresses, and goes about his business. The time taken from introducing the speculum to the final swabbing of the perineum does not in my own practice exceed 30 seconds.

The patient is instructed that he may expect a

feeling of something having been done, not amounting to pain, and that his part in the performance is to avoid alcohol, condiments, and tobacco, and to eat plenty of fresh fruit and vegetables. He is also to take pains to keep the piles from prolapsing during the 24 hours subsequent to injection. Should he omit to do this the prolapsed pile may become inflamed and painful, which is no part of the treatment.

Treatment in like manner is given two or three days later, and repeated twice or thrice a week until piles are no longer demonstrable through the speculum. An average of about nine treatments more or less is, in my experience, necessary. Pile patients complain chiefly of bleeding and prolapse. Many experience much relief after the first treatment; most feel cured after four. Piles can, however, be demonstrated in the anal canal after the symptoms have disappeared, and will eventually trouble the patient unless dealt with.

There appears to be a tendency for other veins of the anal canal to become varicose when the supporting pressure of the piles is removed, and, by seeing the patient from time to time, one can inject these as they show in the speculum, and before they give rise to symptoms. I therefore like to keep the patient under observation for a year, seeing him every two or three months.

Most sufferers from hæmorrhoids complain of constipation, and it is remarkable how this disappears with the piles; indeed, it is quite exceptional for it not to. I ask patients to leave off all purgatives.

My reference has been to the treatment of internal piles, *i.e.*, piles covered by mucous membrane. I regard external piles (those with a skin covering) as the outward and visible expression of internal, and as the latter disappear so do the former either completely shrivel away or leave a remnant as a

TREATMENT OF PILES

skin-tag, which, if need be, may be snipped off.

The untoward effects very occasionally following an injection are :—

(1) *Pain*.—This may result from—(a) Injecting an inflamed pile. This should be avoided and no injection given till inflammation has subsided. (b) Injecting a prolapsed pile and either not returning it into the rectum or allowing it to prolapse again and become strangulated. The patient should take some trouble to keep a prolapsing pile up for 12 hours after its injection. After a few injections, often after the first, the tendency to prolapse will cease. (c) Injecting too low in the anal canal, where the latter is supplied by nerves from the perineum. It is well to start injecting high up and gradually work downward leaving the lower inch of the anal canal till the end of treatment. By so doing that part will probably require no injection at all.

(2) *Sloughing* of the mucous membrane—This will result from too superficial an injection. The sloughs are small, and, although I have not known any harm from them, are undesirable. I endeavour to inject about $\frac{1}{4}$ in. below the surface of the mucous membrane.

(3) *Urinary irritation* may result from injecting in too close proximity to the urethra or prostate. It is not usually severe and passes off in an hour or two.

Prognosis after this treatment is, in my experience, as good as after operative measures. If the original cause of the piles, such as an enlarged prostate or cirrhotic liver, is still operative, then a recurrence is likely sooner or later whether the patient is treated by injection or operation. It is, however, a very simple matter to give a few further injections from time to time as the need arises.

Incidentally, I have been using this injection treatment for pruritus ani with very gratifying results.

Practical Notes.

Hypnotic Drugs and the Digestion.

Fouillouze reports the results of numerous and precise observations upon the effect of hypnotic drugs upon peptic, pancreatic, and biliary digestion.

The drugs observed were :—

Potassium bromide	-	-	-	in a dose of	1 g.
Chloral hydrate	-	-	-	" "	2 g.
Hypnal	-	-	-	" "	1 g.
Veronal	-	-	-	" "	0.30 g.
Trional	-	-	-	" "	1 g.
Morphine hydrochloride	-	-	-	" "	2 cg.

Of these, only two, potassium bromide and morphia, did not alter the process of digestion in any way. All the rest had the threefold effect of (1) delaying peptic digestion; (2) slowing pancreatic digestion for proteins, but increasing it for carbohydrates and fats; and (3) slightly increasing biliary digestion.

The maximum effect was produced by chloral, which appeared to paralyse the action of pepsin of the pancreatic juice in proteins. Veronal was next to chloral in this respect.

Fouillouze draws the following practical conclusions from these observations :—

When using drugs, such as chloral, veronal, trional, sulphonal, and hypnal, which inhibit the digestion of proteins, two rules should be observed so as to avoid digestive troubles which may interfere with the effective action of the drug itself.

1. Never allow these drugs to be taken immediately before, during, or immediately after a meal containing meat, eggs, or other proteins.

2. These drugs should be taken some hours before or some hours after a meal containing proteins, but they may be taken with advantage in the course of a meal consisting of bread, butter, milk, and cheese.

No precautions of this sort appear to be necessary in the use of bromide of potash or morphia.—(*Journ. de Méd. et de Chir. prat.*, January 25, 1921.)

Allyltheobromine.

Jouisse has followed up the results reported by Prof. Pouchet of the use of this compound on animals, by observations on its effects on men. He gave it by hypodermic, intramuscular, or intravenous injection. Clinically, he found that the same favour-

able effects that attend the use of theobromine were obtained, with the advantage that the symptoms of intolerance, particularly vomiting, were very much slower in showing themselves, and never followed when the drug was given by intramuscular injection. These were given into the buttock or into the outer side of the thigh. The patients never complained of any pain being caused, and no local troubles developed. The average doses given were from 40 to 60 cg. In gout, rheumatism and obesity, its effects as a diuretic, as akin to those of caffeine, or as a disintoxicant, were of great interest. In an obese patient weighing upwards of 100 kilos, a big eater and heavy drinker, whose tissues were infiltrated with fat and fluid, he obtained a rapid dehydration without ordering a very strict diet.

In cardiac cases, the drug promotes very favourably the action of digitalis. In these patients, it is best to give the drug by intramuscular or intravenous injection, for many asystolics cannot tolerate medicine given by the mouth. Ascites, hydrothorax, and hydropericardium, which are the corollary of cardiac insufficiency, were all favourably affected by this drug and, as a rule, cleared up quite as quickly as œdema of the limbs.

The disease, however, for which allyltheobromine is actually the medicine of choice is chronic hydropigenous nephritis, characterized by a retention of chlorides, which is often rather considerable, by great œdema in the cellular tissue of the limbs, or by effusion into the serous cavities. In such patients the effects produced were most remarkable, bringing about, in many instances, an actual resurrection.

Jouisse suggests that a further use may be found for the drug in acute infectious diseases accompanied by oliguria.—(*Le Progrès Médical*, March 12, 1921.)

Treatment of Diphtheria-carriers by Hot Air.

Dujarric de la Rivière gave a short account of this method of treatment at the Académie de Médecine in May. It was first tried by Render in 1913 at Lyons. The difficulty of obtaining a clean throat now and again in some convalescents and in the so-called "carriers" is well known, and the infection is often so persistent that the subject is kept indefinitely in isolation, or is sent out with the risk of proving infectious at any time. De la Rivière had fifty successes at the Hôpital Pasteur, each case averaging from three to five sittings to effect a cure; in one case fifteen insufflations were necessary. The hot air is obtained by electrical apparatus, and the sittings should last for from ten to fifteen minutes. The treatment is well tolerated as a rule, but the application is stopped as soon as the patient finds the heat too great to be borne.—(*Le Progrès Médical*, May 14, 1921.)

Reviews of Books.

A Manual of Practical Anatomy : A Guide to the Dissection of the Human Body. By THOMAS WALMSLEY, Professor of Anatomy in the University of Belfast, with a Preface by THOMAS H. BRYCE, M.D., Professor of Anatomy in the University of Glasgow. In 3 Parts. Part I. Pp. 176. London : Longmans, Green & Co. 9s. net.

WHEN a student begins the study of anatomy, he is frequently bewildered by its complexity, and by the fact that there are two series of text-books, which he is expected to master. The two series are those dealing with "Descriptive Anatomy" and those with "Regional Anatomy." Of the former, "Quain" or "Gray" is the type; of the latter, the much-esteemed "Ellis" was the text-book in previous years. This Manual of Practical Anatomy, by Prof. Thomas Walmsley, combines the essentials of both types of text-books. Inasmuch as anatomy can only be learnt by practical work, a plain straightforward guide is required; in fact, a "directory of dissection," as Prof. Bryce styles the work under notice. Therefore the details of dissection are printed in larger type than the descriptive matter, with the view of reversing the emphasis, as given in the ordinary practical manuals. The diagrams are simple and schematic; they are aids to observation, and help the student to visualize the structures in relation to one another. The aim of the work has been to enable the student to grasp what kind of knowledge of anatomy he should seek to acquire, and the degree of it that is expected of him for all practical purposes. We are glad of the opportunity of congratulating the author on the successful achievement of his objects as evidenced by a perusal of Part I.; and we have no doubt that Parts II. and III., when they are ready, will be of the same standard. The work will prove popular because it fulfils definite requirements.

Military Psychiatry in Peace and War. By C. STANFORD READ, M.D. Pp. 168. London : H. K. Lewis & Co., Ltd. 10s. 6d. net.

DR. READ was in charge during the war of "D" Block, Netley, the Clearing Hospital for mental cases arising among the overseas forces. From August, 1914, to May, 1919, 12,320 cases passed through the hospital. Dr. Read had, accordingly, exceptional facilities for observing the relations between military service and mental disorders. Dr. Read belongs to that school, gradually

REVIEWS OF BOOKS

increasing in this country, which more and more finds a psychogenic factor in the ætiology of the psychoses, and his book is a welcome relief to those (emanating mostly from high authority) which have dealt with this subject on well-established lines. and have been unwilling to admit that the modern developments of psychology and psycho-analysis may very probably radically alter our conception of many of the forms of insanity. The author opens his book with an exceedingly interesting and suggestive chapter on the psychology of the soldier. In later chapters he considers *seriatim* the most prominent forms of mental disorder.

Speaking generally, we may say that this is a highly stimulating and valuable book. The author is throughout careful to avoid a dogmatic attitude, and his observations are mainly in the nature of suggestions, based upon his experiences, which nevertheless require further investigation to determine their soundness. It is to be regretted that the relatively short time during which most of the cases remained at Netley precluded, as a rule, any extensive psycho-analysis. In a future edition an index might be added with advantage.

Pellagra. By H. F. HARRIS, M.D. Pp. 421. New York and London : The Macmillan Company. 26s. net.

THE author has added to the literature on pellagra a systematic discussion on the subject in which practically all that has been done in it of value has been noted, important papers abstracted, and the opinions of others faithfully represented. The causation of pellagra is discussed at length and merits the most careful study.

The symptomatology, treatment, diagnosis, and prophylaxis are discussed at length. One of the most valuable features is the extensive bibliography.

The book is illustrated by a series of five plates showing the inflammation of the mucosa of the mouth, the papular erythema of the backs of the hands, and microscopical sections of nerve tissue affected by the disease.

Symptoms of Visceral Disease. By FRANCIS MARION POTTINGER, M.D., F.R.C.P., &c. Pp. 328, with 86 text illustrations and 9 coloured plates. London : Henry Kimpton.

AMONG the more recent researches on the physiological and pathological factors in the interpretation of symptoms, those connected with study of the vegetative nervous system are both interesting and full of promise. The necessity of specialization in the practice of medicine is fully established, and it is at its best when the specialist "regards his field of study in its intimate relationships to the body as a whole." In cordial co-operation between the laboratory and clinical observation lies the road of true advancement in medical knowledge. This is the spirit which pervades the volume before us. The extent of ground covered by this work is so great that it is impossible with the space available

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to give more than a few indications of its character and scope.

The purpose of the author is to indicate the value of the study of the viscerogenic reflex in the interpretation of symptoms.

The time and labour spent over the book must have been great, and, as a type of the thorough manner in which the subjects are handled, we would refer to the section dealing with intestinal stasis on pages 134, 135. The book is one which should be studied by all who desire to be abreast with modern medicine.

For the purpose of reference a brief summing up of salient points and their practical application at the end of each chapter would enhance the value of the book to the busy practitioner.

The Prevention and Destruction of Rats. By ELLIOT B. DEWBERRY, Sergeant-Major, Royal Army Medical Corps; Member Royal Institute of Public Health, etc. Pp. 47. London: John Bale, Sons, and Danielsson, Ltd. 2s. net.

IN this pamphlet the author describes the two species of rat met with in England, namely, the black and the brown rat, with the preventive measures against their invasion, such as the protection of food, destruction of refuse, and protection of buildings and drains, and the methods of destruction, namely, poisoning, trapping, and hunting with dogs and ferrets. In connection with trapping, the author refers to an interesting observation by Mr. Rodier in connection with the rat problem in Australia; in his view the usual method of indiscriminate slaughter of rats benefits rather than injures rats as a whole, but he considers that if rats were trapped alive, the does killed, and the males liberated, that this would result in a large excess of males, and these would so harass the females and each other that effective pairing would rarely take place.

The pamphlet has a short and appreciative preface by Sir A. E. Shipley, of Cambridge.

Manic-Depressive Insanity and Paranoia. By PROFESSOR EMIL KRAEPELIN, of Munich. Translated by R. MARY BARCLAY, M.A., M.B. Edited by GEORGE M. ROBERTSON, M.D., F.R.C.P. Edinburgh: E. and S. Livingstone. Pp. 280. 2ls. net.

THE view first put forward by Professor Kraepelin that mania and melancholia are different phases of a single form of mental disorder, to which he has given the name manic-depressive insanity, has now been almost universally accepted by alienists. In this book the Professor has carried his conception a step further, and now includes what is often known as involutional melancholia in the group. A very full description of the symptoms presented by the different types is given, with many clinical examples and numerous excellent illustrations. In the second part of the book the author has used the term paranoia in the narrowest sense, restricting it to those forms which are described as "true" or

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non-hallucinatory paranoia, the hallucinatory forms being mainly grouped under the title paraphrenia, though some may be included under paranoid dementia præcox. Here also the accounts are complete, vivid, and well described; we regret, however, that the author dismisses with a few contemptuous words, as "not supported either by a clearly defined conception of paranoia or by evidence at all acceptable," the Freudian view that paranoia is associated with repressed homosexuality. The evidence which has been brought forward of this association is too strong to be ignored, and it merited closer investigation by Professor Kraepelin. We strongly recommend this book as a valuable contribution to the study of insanity, and one which every alienist should possess. Dr. Mary Barclay is to be congratulated upon the excellence of the translation.

Minor Surgery and Bandaging. (Heath, Pollard, Davies.) By GWYNNE WILLIAMS, M.S., F.R.C.S. Seventeenth edition. Pp. 447 and 236 illustrations. London: J. and A. Churchill. 10s. 6d. net.

THE first edition of this medical classic appeared in 1860; and this, the most recent and seventeenth, just 60 years later, the editions thus extending over at least five generations of medical students. A large amount of new material is dealt with both in subjects and in details. We welcome the chapters on the examination of patients, on asepsis, on the preparation of the patient for operation, the *mise-en-scène* of the operation, and post-operative treatment. They are exactly what the house surgeon and dresser require, and are so treated by the present editor as to meet all the ordinary problems. The chapters on acute abdominal conditions and on minor operations are helpful both to them and to the junior practitioner. There are very few points of usefulness not touched upon, but we note the omission of a description of the Staffordshire knot in tying pedicles, and the "cigarette" drain might have been mentioned. So far we have found but one typographical error, on p. 15, "materials" appearing as "materials." A valuable chapter on the administration of Anæsthetics and Local Regional-Spinal Anæsthesia is contributed by Drs. Dudley W. Buxton and Felix Rood, and merits close study and attention.

So many are the excellent points in this edition that it is impossible to notice a tithe of them within the compass of a short review; we wish we could do so nevertheless. Let us say that the traditions of thoroughly sound work and advice permeating previous editions have been upheld in every way by Mr. Gwynne Williams. He has written clearly, concisely, and pleasantly, and has maintained a due sense of proportion in selecting his material and presenting it to his large circle of readers; and it will not be a long time before a new edition is required.

Preparations, Inventions, Etc.

“DERBAC” SHAMPOO SOAP.

(London: Sapon Soaps, Ltd., London Bridge, S.E.1.)

This soap is composed of saponified tar from Russian birch root, and has a pleasant aromatic smell. It makes an excellent lather with hot water, and its application produces no irritant effect on the skin but, on the contrary, has a soothing influence. It has been introduced for the safe, quick and effectual treatment of pediculosis on the head, pubis, and body, and the tar has the property of killing the actual insect as well as the embryo in the nit.

We have given the soap a trial on some regular “farmyards” in patients admitted to hospital, and have found that it is most successful in exterminating the pest.

CROOKES’ COLLOSOLS.

(London: British Colloids, Ltd., 22, Chenies Street, W.C.1.)

We have received a brochure giving full details of these preparations which are issued from the Crookes’ Laboratories. Particulars of the references in current literature are included showing the range of action of these preparations. The book is issued to the medical profession only.

THE IVORY CASTLE FAIRY BOOK.

(London: Messrs. D. and W. Gibbs, Ltd., Cold Cream Soap Works, E.1.)

This little book is charmingly got up and illustrated, and will certainly appeal to children. In it is contained an account of the formation and growth of the teeth, and of the sad fate that comes to those who neglect to attend to them properly and keep them clean, all set forth in true fairy form and quite simply written.

THE PRACTITIONER

AUGUST

1921

The Successful Treatment of Leprosy

BY INJECTIONS OF SOLUBLE PREPARATIONS
OF THE FATTY ACIDS OF CHAULMOOGRA
AND OTHER OILS, AND ITS BEARING
ON THE TUBERCULOSIS PROBLEM.*

By SIR LEONARD ROGERS, M.D., F.R.C.P., F.R.S.,
I.M.S. (Ret.).

Physician and Lecturer, London School of Tropical Medicine.

IN this country, leprosy is more of historical than of direct practical interest; but in India and China, the two most densely populated countries in the world with their hundreds of thousands of lepers, as well as in many other tropical and sub-tropical countries, the disease presents problems of the greatest magnitude and difficulty. Any improvement in the treatment, and especially one which exerts a destructive effect on the acid-fast lepra bacilli in the human tissues, cannot fail to be of interest in itself, apart from its possible bearing on the still wider problem of tuberculosis due to a closely similar acid-fast organism. I, therefore, welcome an

* Read before the Therapeutical Section of the Royal Society of Medicine. Specially revised for THE PRACTITIONER by the author.

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opportunity to bring the researches of my last five-and-a-half years in India on the treatment of leprosy before this Society, for they have now received sufficient confirmation to establish a definite advance towards the solution of a difficult problem; although, in view of the long latent period the disease may occasionally show, it is still too early to estimate the degree of permanency of the results, and I have throughout declined to speak of cures.

The Use of Chaulmoogra Oil in Leprosy.—There has been some confusion in the past regarding the origin of chaulmoogra oil of commerce, for it had been thought, for nearly one hundred years, to be derived from the seeds of *gynocardia odorata*; but, in 1901, Sir David Prain, I.M.S.,¹ recognized them as those of the Assam and Burma tree, *Taraktogenos kurzii*, and the preparations I first used were derived from seeds of this variety identified for me by Dr. Carter, then Economic Botanist, Calcutta. This oil has, for a long time, had a reputation in India as a remedy for leprosy, and was also recommended for use in syphilis and tuberculosis some 50 years ago^{1 and 2}. Unfortunately, its bad effect on the digestion makes it very difficult to give it in sufficient doses materially to influence well-established leprosy, which has hitherto greatly limited its therapeutic value, although there is a general consensus of opinion that it does exert a definitely retarding effect on the progress of leprosy. The best evidence of its value was obtained by Hopkins,³ in his 15 years' trial of chaulmoogra oil orally at the Louisiana Lepers' Home, which may be summarized in the following table:—

	Cured.	Lesions disap- peared.	Im- proved.	Progress arrested.	Worse or Died.
	%	%	%	%	%
82 incipient cases -	17	4	24	14	12
88 advanced cases -	0	0	21	5	71

Thus, distinctly favourable results were obtained in

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incipient cases, but almost complete failure in fully-developed ones.

Dr. Victor G. Heiser's *Injections of Chaulmoogra Oil*.—A further advance was made in 1913 by Dr. Heiser,⁴ whose splendid work in largely clearing the Philippines of leprosy, by organizing compulsory segregation of lepers in the Cullion Island Leper Colony, is so well known. He treated a small series of cases by intragluteal injections of a mixture containing chaulmoogra oil 60 c.c., camphorated oil 60 c.c., and resorcin 4 grammes, the latter two being added to lessen the pain, and reported 11.1 per cent. as "apparently cured," all signs of the disease having disappeared. Several other workers recorded encouraging results by this method, Hollmann and Dean,⁵ in Honolulu, having reported 12 cases which became bacteriologically negative, of which only two relapsed. In Indian leper asylums, it was found to be very difficult to get the patients to persevere long enough with these painful injections to allow of much success being obtained, although it is undoubtedly an advance on oral administration of the nauseating oil.

Chemical Composition of Chaulmoogra and Hydnocarpus Oils.—In 1879,⁶ Moses showed chaulmoogra oil to contain gynocardic and other unsaturated fatty acids; and, in 1904, Power and Gornall⁷ separated chaulmoogric acid and demonstrated that it differed from all other known fatty acids in having a closed five-membered carbon ring and in being strongly dextrarotary, and also showed that gynocardic acid of previous workers was a mixture of a number of lower melting-point fatty acids. In the following year, Power and Barrowcliff⁸ showed that the oil of *Gynocardia odorata* seeds did not contain chaulmoogric acid or its homologues, but that the seeds of *Hydnocarpus wightiana* of the Western Peninsula of India, and also those of *Hydnocarpus anthelmintica*,

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do contain chaulmoogric acid and a lower homologue of the same series—hydnocarpic acid. In 1916, Brill,⁹ in the Philippines, confirmed the above observations, and also obtained the same two fatty acids from *Hydnocarpus venenata*; while Dr. Sudahamoy Ghosh,¹⁰ working with me in Calcutta, has obtained similar results with these various oils. The oil from the inactive *Gynocardia odorata* can be easily distinguished, by its optical inactivity, from the chaulmoogric acid-bearing oils.

The Preparation of Soluble Compounds of the Fatty Acids of Chaulmoogra and Hydnocarpus Oils.—Early realizing the difficulty in getting leprosy patients to persevere with the large nauseating doses of chaulmoogra oil necessary to produce appreciable benefit, and after having satisfied myself, by trials at the Calcutta Gobra Leper Asylum, that nastin was of little value, I treated a few private cases of leprosy by the oral administration of increasing doses of gynocardic acid, and convinced myself that the results were more satisfactory than with the whole oil. In 1912, I asked a firm of manufacturing chemists if they could make for me any soluble compound of gynocardic acid suitable for subcutaneous injection, but received a reply in the negative. Soon after, a European patient with extensive macular and æsthetic leprosy, on my advice, took increasing doses of gynocardic acid, until 40 grains a day was reached and persevered with in spite of considerable flatulence; and, at the end of about a year, the macules had all disappeared and the skin lesions became bacteriologically negative, although anæsthetic signs remained.

In the middle of 1915, Dr. Heiser visited my laboratory in Calcutta, and suggested that I should take up work at the treatment of leprosy; I showed him the above-mentioned patient, and said I wished to get a soluble preparation of gynocardic acid for

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injection in place of the whole oil he had used. With the kind help of Dr. Chuni Lal Bose, Professor of Chemistry, Calcutta Medical College, and subsequently of Dr. Sudnamoy Ghosh, D.Sc.Edin., who has since worked at the chemistry of chaulmoogra and hydnocarpus oils with me under a grant from the Indian Medical Research Association, I obtained soluble sodium salts of gynocardic acid, as well as of fatty acids of different melting-points consisting mainly of chaulmoogric and hydnocarpic acids, and began a long series of tests of their value by injection in the treatment of leprosy. I subsequently learned that sodium gynocardate had been used orally by others; I found it produced less flatulence than gynocardic acid, and have used it extensively orally in addition to injections, although this is not essential to success, but useful to maintain the effects of the drug in periods during which the injections have to be stopped for any reason.

At first, I used the more soluble lower melting-point acids of about 37° C.; but, subsequently, I found that the sodium salts of fatty acids, with melting points between 50° and 62° C., were sufficiently soluble for intravenous injection, and gave better results than the lower melting-point preparations, which consisted, mainly, of gynocardate of soda; while those of higher melting-point, termed provisionally gynocardate of soda A—and, subsequently and more correctly, hydnocarpate of soda, of which they largely consisted—also contained some of the lower melting-point gynocardate, as well as a certain amount of chaulmoograte of soda. The last mentioned, in pure form, proved too insoluble for injection; but I found it could be given mixed with some of the lowest melting-point gynocardates, but appeared to be less active than the hydnocarpatates. Moreover, we found that a larger proportion of the

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active hydnocarpates could more easily be obtained from the hydnocarpus oils than from chaulmoogra oil from the *Taraktogenos kurzii*. The higher melting-point preparations were more difficult to give intravenously on account of their being more irritant to the veins, sometimes causing a very localized adhesive phlebitis, rendering the affected vessel useless for further injections; but the addition of one-half per cent. sodium citrate to the solution lessened this trouble to a great extent.

After ascertaining, by animal experiment, that the gynocardates were not toxic except by producing very temporary giddiness in full doses, I began its subcutaneous use¹¹ in volunteering leprosy patients; and although some local pain and induration were produced, undoubted improvement was noted in some of the cases within a few months, but it was rather slow and some of the patients did not persevere very long with it, so there was clearly room for further improvement.

Intravenous Injections of Sodium Gynocardate and Hydnocarpate with Reactions and Destruction of the Lepa Bacilli in the Tissues.—Having ascertained that 3 per cent. solutions could safely be injected into the veins in considerable doses in animals, I began with the very small dose of 0.2 c.c. intravenously¹² and gradually worked up to 5 c.c., the larger doses being injected slowly to lessen the giddiness produced, and I found this method to be practically painless and not objected to by the patients.

Soon after beginning the intravenous use of small doses of the 3 per cent. solution of sodium gynocardate, I noticed that slight febrile reactions might occur a day or two after the injection, especially in advanced nodular cases with enormous numbers of bacilli in their tissues, and they appeared to be bene-

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ficial, for more rapid softening and absorption of the nodules ensued. Occasionally, a more severe and prolonged febrile reaction took place, accompanied by swelling, redness, and softening of the nodules; on making microscopical examinations of such softened nodules, it was found that the lepra bacilli were breaking down extensively, so that only a very few rod-shaped bacilli remained together with innumerable red dots of disintegrated organisms, as illustrated in one of my papers.¹³ This, so far as I know, is the first time that such a phenomenon has been observed in a human pathogenic bacillus due to the use of a vegetable substance.

Examinations (at intervals of a month or so) of the nodules of treated cases not showing reactions revealed a similar process of a more gradual nature, until only a few red dots would be found in portions cut out for microscopical examination, and eventually no trace of the organism remained, and the lesions became bacteriologically negative.

Very occasionally, more severe reactions, with prolonged fever for a month or more and great debility, occur in advanced cases, which may be followed by most remarkable improvement extending over many months, in spite of all treatment having been stopped, as in the two following instances:—

A very advanced case of over 20 years' duration, with extremely thickened nodules on the face and extensive ulceration of the ears and fingers, showed some improvement after subcutaneous injections of sodium gynocardate. I then gave a very small dose intravenously, which was followed by prolonged intermittent fever and softening and retrogression of the nodules. He had no more injections, but a year later he showed the most remarkable improvement I have ever seen in such an advanced type of the disease. The facial and other nodules had disappeared, although soft folds of skin remained at their sites, and both the ears and the fingers had completely healed.

The other patient showed thickened red patches on his nose like large grog-blossoms, similar patches the size of the palm of the hand on his back, and smaller ones elsewhere. After a few small doses of sodium hydncarpate intravenously he had a slight

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febrile reaction, and although the next dose was reduced he had a severe febrile reaction of a month's duration accompanied by weakness, during which the patches showed first swelling and softening and then began to shrink. He wished to resume the injections, but I gave him sodium morrhuate orally, and at the end of a year only slight depressed scarring could be seen on close examination of his nose, whilst his back showed a pitted scarred condition without discoloration, while on section the sites of the former extensive lesions proved to be negative bacteriologically.

In other cases, the improvement has been only temporary, and further injections were necessary. Dr. Spittel,¹⁴ in Colombo, reported bad effects from such reactions; but, after I had seen great improvement slowly follow them, I wrote to ask him the ultimate results in his cases; but, unfortunately, he had not been able to follow them up, so they may, eventually, have been favourable as in mine, especially as J. T. McDonald,¹⁵ in Honolulu, later found that these severe reactions were not injurious except temporarily, and were followed by remarkable improvement and more active progress towards recovery than before their occurrence.

Duration of Treatment required.—It commonly takes from six months to a year or more to clear up the lesions of a typical case, while experience shows that it is advisable to continue the treatment for at least six months after the lesions and nasal secretions have become bacteriologically negative, with probable loss of infective power; but, during the latter period, the injections may be given less frequently, or sodium gynocardate administered orally, to lessen the danger of a relapse taking place. Further experience is required before the exact duration of treatment can be laid down, but the fact that relapses have taken place in several patients, who had left off treatment against advice as soon as their lesions had disappeared, taken with the occasional long incubation periods, indicating that the bacilli may remain latent in the body for a number of years, and the analogy with tuberculous infections, all indicate that it is well, in

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the present state of our knowledge, to err on the safe side by prolonging treatment for many months after all symptoms have disappeared.

The Use in Leprosy of Soluble Preparations of the Fatty Acids of other Oils.—As soon as I had satisfied myself that gynocardate of soda, intravenously, could produce breaking up of the lepra bacilli in the tissues, I naturally thought of the possibility of obtaining a similar result in the case of the still more important acid-fast bacillus of tuberculosis, and I suggested a trial of sodium gynocardate in that disease. The painfulness of subcutaneous injections of this salt and the possible danger of its intravenous injection producing prolonged febrile reactions, as occasionally seen in leprosy, which might conceivably lead to generalization of a tuberculous infection in man, however, made me hesitate to use the new drug in that disease except orally, which was not always well borne by phthisical patients. I, therefore, turned to cod-liver oil, which is the one drug which has for long retained its reputation in tuberculosis; and, with the help of Dr. S. Ghosh, a sodium salt of the fatty acids of this oil was made, which I called sodium morrhuate. It was readily soluble in water, caused little pain on subcutaneous injection, being evidently more readily absorbed by this route than sodium gynocardate, while it was also unirritating to the veins, being thus a very convenient preparation for injection by either method.

Sodium Morrhuate in Leprosy.—I first used it subcutaneously in leprosy patients whose veins no longer permitted of the intravenous use of the more irritating gynocardate, and soon observed that patients, who had ceased to improve further on the latter drug, might once more progress, eventually clear up completely, and become bacteriologically negative on sodium morrhuate. I next used the drug subcutaneously, and later intravenously, in fresh cases of

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leprosy; and, in the very bad case, the Drawings of which were published in one of my papers,¹⁶ the extensive thickened red patches on his face and body greatly improved in two months, and completely cleared up and became bacteriologically negative in five-and-a-half months, on the almost painless subcutaneous injections of sodium morrhuate; that is, in a shorter time than is usually required with intravenous gynocardates. Further observations showed that sodium morrhuate, both subcutaneously and intravenously, gave very similar results to gynocardates intravenously in leprosy, with less trouble; while the two solutions, each of a strength of 3 per cent., can be injected into the veins, mixed together up to a total dose of 5 c.c., with less irritation and giddiness than with sodium gynocardate or hydnocarpate alone, or a course of one may be alternated with the other with advantage. This was clearly an important advance, or it opened up a wide field of research with similar preparations from other oils, which I next followed up during my last year in India.

Sodium Soyate in Leprosy.—The next step was to investigate other oils with a large content of unsaturated, fatty acids, as shown by a high iodine value, for which purpose I selected linseed oil, on account of its having been used in the place of cod-liver oil in phthisis in India owing to its cheapness, soya bean oil, and Japanese sardine oil, which all have a very high iodine value. The sodium salts of the fatty acids of linseed oil proved to be irritating to the subcutaneous tissues on injection, causing much induration, while the preparation from Japanese sardine oil was found to be toxic to animals. The preparation from soya bean oil, which may be conveniently termed sodium soyate, proved to be very suitable for subcutaneous or intravenous injection; and during a trial shortly before I left India, the

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patient with a very extensive thickened red patch covering the whole of his right cheek, completely cleared up and became bacteriologically negative within the remarkably short space of six weeks, a quicker result than I had previously seen.¹⁷ In other cases, it was not so successful, and, from reports I have since received from Calcutta, it does not appear to be better than the former preparations from other oils, although it may well prove useful as an alternative to them, while it establishes the important fact that active preparations can be obtained from other oils having a high proportion of unsaturated fatty acids than those hitherto used in medicine; while, as soya beans are an excellent food, they will be well worth trying as an article of dietary in leper asylums, preferably with controls under otherwise similar conditions. It is also of importance to note that both sodium morrhuate and sodium soyate produce reactions, followed by rapid improvement, when administered by the simple subcutaneous route, which is not the case with subcutaneous injections of sodium hydnocarpate.

Ethyl Ester preparations of the fatty acids of chaulmoogra and cod-liver oils were also made, but the former proved somewhat irritating subcutaneously, although it has been used successfully in Honolulu by intramuscular injection, and is now being tested in India by Dr. Muir, in several hundred cases, with very promising results.

Results of Four Years' Trial of the New Treatment.—In October, 1917,¹³ I published the results of two years' trial of subcutaneous and intravenous injections of sodium gynocardate (illustrated by coloured plates), which included the use of preparations from the fatty acids with melting points up to 51° C., containing hydnocarpates as well as gynocardates. In May, 1919,¹⁶ I recorded further experience, including the use of sodium morrhuate, and in a paper read

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at the Calcutta Leprosy Conference in February, 1920,¹⁷ I brought my experience up to the termination of my researches in India, which may be briefly summarized in the following table:—

		Non-im- proved.	Slightly im- proved.	Greatly im- proved.	Lesions disap- peared.	Total.
Sodium gynocardate	3	1	9	20	21	51
months and over.						
Do. over one year	-	1	1	2	9	13
Sodium morrhuate	3 to	0	3	12	5	20
12 months.						

All cases treated for as long as three months have been included, although much longer is required to obtain the full effects of the treatment; yet with sodium gynocardate 41 per cent. showed complete disappearance of all signs of the disease, and in 39 per cent. more very great improvement, with good prospects of complete clearing up with further treatment was obtained, or a total of 80 per cent. of "greatly improved" or "lesions disappeared," while only one very advanced case was a complete failure, although the patient thought himself to be better. The second line shows 13 cases treated for upwards of a year, with 69 per cent. classed as "lesions disappeared," which includes negative bacteriological examinations. In the sodium morrhuate cases the treatment had not been continued in any for more than one year, yet 17 out of 20, or 85 per cent., were classed as "greatly improved" or "lesions disappeared."

After-results.—Of even greater importance is the duration of the good effects in 34 cases followed up for some time, as shown in the next table.

	Not im- proved.	Further im- proved.	Lesions disap- peared.	Remain- ing well.	Re- lapsed.
Sodium gynocardate	1	5	5	10	5
Sodium morrhuate	0	5	0	3	0

Of the sodium gynocardate series five had shown

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further improvement, and in five more the lesions had disappeared, bringing that class up to 65 per cent., a very satisfactory result when it is considered that in one-third of them the previous duration of the disease before treatment varied between five and fifteen years. On the other hand, five cases had relapsed, all patients who had left off the treatment against advice as soon as their symptoms had disappeared, although some of them subsequently cleared up again on resuming treatment. These relapses are of great importance in emphasizing the necessity of prolonged treatment after disappearance of the symptoms, and justify my caution in not speaking of cures. Nevertheless, at the time of my last report, four of my earlier cases had remained free from all signs of leprosy for over two-and-a-half years, and six more for upwards of one year, while I have recently learned that another year may be added in the case of some of them, so it is quite possible that a few will eventually prove to be real cures. Fortunately, before I left India, I was able to obtain funds for a whole-time worker to continue my researches in the Calcutta School of Tropical Medicine for the next five years, and also secured the services of Dr. E. Muir, who has already more than once reported favourable results in leprosy from my methods, and is now working with several assistants on a larger scale than I was able to do.

Confirmation of my Results.—The most extensive trial of my methods was that carried out by the Mission to Lepers in thirteen asylums in various parts of India, the reports of which were analysed for the Calcutta Leper Conference by E. Muir.¹⁸ Sodium hydnocarpate was used in 183 patients, and sodium morrhuate in 117, while at my suggestion Heiser's chaulmoogra oil injections were also tried, but were soon given up on account of the much greater pain they caused. The period of treatment varied from two months to a year,

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in doses of from one-half to five c.c. of the 3 per cent. solutions, the duration of the disease varying between one-half and twenty-five years; although in most of the cases the treatment was of comparatively short duration, definite improvement was obtained in 72 per cent., and much improvement in 32 per cent., the two drugs used giving practically identical results, thus confirming the good results of my original trials of sodium morrhuate, as well as of hydnocarpates. In those patients who were treated for from six months to one year, 100 per cent. showed definite improvement, while in 52 per cent. it was pronounced, including some in which the lesions disappeared, all the observers being convinced that the new treatment was an advance on previous methods.

Favourable reports have also been recorded by Cadbury in China;¹⁹ Muir²⁰ in Bengal; Peacock²¹ in Burma, with intragluteal injections of sodium gyno-cardate; Carthew²² in a Siam jail, where he was able to follow up 14 cases, and reported not improved 0, slight or general improvement 2, very decided improvement 8, and lesions disappeared and remained absent for from six to eighteen months 4; Connel²³ in Africa; P. Gunguli²⁴ in the Punjab; and Ernest Neve²⁵ in Cashmir.

K. K. Chaterji, in Calcutta, has also reported good results in leprosy from injections of soluble preparations from nim oil, including an ethyl ester compound, which adds one more to the fatty acids which have an effect on this disease.

Ethyl Ester Chaulmoogrates in Leprosy.—A recent modification of practical importance is the intramuscular injection of ethyl ester compounds of the fatty acids of chaulmoogra oil, in place of the more troublesome intravenous injections of sodium salts, which allows of a larger number of patients being treated in the same period of time, and getting over the occasional

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difficulty over small veins in women and children. In the case of sodium morrhuate and sodium soyate this objection has little weight, for they yield good results by nearly painless subcutaneous injections. A. L. Dean,⁵ Professor of Chemistry in Honolulu, in 1919, and with Wrenshall in 1920,²⁶ has reported an investigation by fractionation of chaulmoogra oil on closely similar lines to those previously used in Calcutta, and made ethyl ester compounds, which he considered more suitable for injection than my sodium salts, although the latter are the form in which these fatty acids are naturally absorbed from the digestive canal. H. T. Hollmann⁵ at the same time recorded favourable clinical results in 25 leprosy cases from the use of Dean's preparations, all having improved, while eight had become bacteriologically negative within a few months. In 1920, J. T. McDonald¹⁵ was able to report that 78 of the Honolulu leper hospital patients had been parolled by a medical board, none of whom had relapsed at the time of his report. Moreover, patients with leprosy were voluntarily seeking admission to the hospital in a way they had never done before.

There is thus no doubt that a very great advance has been made in the treatment of leprosy by my researches in Calcutta, and the more recent valuable extension of the work in Honolulu, which may well lead before long to actual cures of this terrible disease being obtained. Moreover, the hopes these advances hold out of effective treatment should prove of great value in attracting the more amenable early cases to the leper colonies which are about to be started in India, and thus help in enabling more extensive segregation, with lessened danger of the continued spread of the disease, for comparatively early cases are frequently very infective through their nasal discharges; while they are particularly liable to remain

undetected in positions, making them a great danger to others, as, for example, through being employed in connection with food, etc.

The especial Susceptibility to Leprosy in the First Two Decades of Life.—I have recently²⁷ drawn attention to a point in the epidemiology of leprosy, which is of interest from its analogy to tuberculosis, namely; the especial susceptibility to infection during the first two decades of life. From figures recorded by McCoy for the Malakoi settlement of the Sandwich Islands, I estimated that 65 per cent. of the infections occurred during the first two decades of life, while Atar, in Brazil²⁸ found the majority of lepers admitted to the Para hospice from 1900 to 1918 were under 20, and a very large majority under 30, years of age. Demy,²⁹ in his study of 10,000 cases of leprosy in the Philippines, showed the probable source of infection in 73 per cent. of positive histories was between brothers and sisters, cousins, or children from their parents, all most likely to occur before adult life is reached, while in only from 1 to 2 per cent. was it between husband and wife, while McCoy,³⁰ in the Sandwich Islands, found the latter figure to be 2·6 per cent., indicating a much less susceptibility in later than in early life. Again, Lie,³¹ in Norway, among 481 marriages of lepers, found infection in 10·27 per cent. of the children of leper fathers, 16·39 in those of leper mothers, and no less than 39·19 when both parents were lepers; and McCoy³² has shown that the fecundity of leper mothers is not decreased. Again, Demy²⁹ showed that no less than 44 per cent. of children who lived with leper parents for seven to ten years contracted the disease, which is in great contrast to the relatively low incidence among married adults, while numerous records show that if children are separated from their leper parents at an early age they nearly invariably remain free from the disease. I, therefore, regard the prevention

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of the exposure of children and young adults to contact with lepers as one of the most important measures for controlling the disease.

The great frequency and importance of infection during childhood with tuberculosis is firmly established, and a recent paper³³ by Armand-Delille on the work of the Grancher Institute of Paris for the protection of childhood from tuberculosis, by permanently removing children out of tuberculous families living in confined quarters, clearly demonstrates the value of this measure. Thus, the incidence of active tuberculosis among children left in the care of their infected relatives was more than 60 per cent., quite apart from latent disease becoming active in later life, while among 2,200 children rescued from similar exposure to infection from tuberculosis by the Paris Grancher Institute during nearly eighteen years, only seven cases had occurred, two fatal meningitis, and five recovering ones, the incidence being thus only 0·35 per cent., and the mortality 0·1 per cent. In tuberculosis, then, as well as in leprosy, the prevention of susceptible children from living in crowded houses with infected adults is one of the most important measures for lessening the incidence of these two closely similar diseases, and it is to be hoped that before long this essential fact will be brought sufficiently home to the public to allow of the necessary compulsory powers being obtained to enable it to be more generally applied, for in few diseases is prevention so much easier and better than cure than in leprosy and tuberculosis.

Trials of Sodium Morrhuate and Sodium Hydnocarpate in Tuberculosis.—I have already mentioned that I first made sodium morrhuate for trial in tuberculosis, and soon found it to be of great value in leprosy. After demonstrating that it had very little toxicity for laboratory animals, I attempted to ascertain if it had any power of controlling tuberculosis in

infected rabbits and guinea-pigs; but, unfortunately, two attempts failed owing to the cultures I could obtain in India, including a bovine one from the Mukhtesar veterinary laboratory, failing to produce lethal effects in the control animals, having evidently lost their virulence. As a trial in a few cases of tuberculosis indicated that the treatment was, at least, harmless, I got other³⁴ and ³⁵ medical men with greater opportunities to test it, and early in 1919 I reported the results of a year's trial, all but one of which were favourable, while in none had any harm occurred, and I concluded :—

The records of the careful clinical trials of sodium morrhuate, in various forms of tuberculosis by several medical men during the past year, given in this paper, appear to me to justify the publication of the method to enable others more favourably placed than I am to investigate it further, in order to ascertain if the new treatment produces any permanent beneficial effect in the greatest scourge of mankind. I am hopeful that sodium morrhuate will prove at least as useful as the tuberculin treatment now in general use, and also be much safer in the hands of the profession at large, many of whom have not the extensive expert experience necessary for the safe use of that double-edged weapon—tuberculin.

Since that time I have had very little opportunity of testing the method further, while the most recent reports have not been very favourable to the new treatment. One experienced Civil Surgeon in India reported to me 18 cases of tuberculous glands, in all of which some febrile reaction and swelling up of the local lesions had occurred under the treatment, followed by gradual subsidence of the disease, although in one recurrence had taken place. Captain P. Gunguli, I.M.S.,³⁶ in 1920, reported very favourable results in phthisis in Indian Sepoys in the dry and cool climate of Quetta, 4 early and 8 out of 28 advanced cases being discharged “cured” by a medical board, and 10 more “greatly improved” cases were also subsequently discharged “cured” by the board, while two lupus cases also cleared up under sodium morrhuate. In

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the Calcutta European General Hospital, Major Green Armitage, I.M.S., has used the drug extensively, and has informed me that the results were a great improvement on former methods of treatment. On the other hand, A. Gripiolo and C. Spada³⁷ treated eight cases of phthisis and two of surgical tuberculosis, and concluded that, like tuberculin, sodium morrhuate has a selective action on tuberculous lesions which may have an unfavourable influence on the course of the disease, the 3 per cent. solution being too strong in some patients, while Max Bieserthal³⁸ treated 25 cases of phthisis for four months with sodium morrhuate and did not obtain any definitely favourable results, although he thinks further work is necessary to settle the question of its use. He is in error, however, in attributing to me the statement that sodium morrhuate "was the best line of treatment for tuberculosis in general," when a careful perusal of my paper will show that this was a quotation from a report by one of those who tried the drug for me, while I have never expressed such an opinion. The same worker also tried sodium-gynocardate A (hydnocarpate) in 10 cases of phthisis, but saw no beneficial results from the short course of ten weekly injections. H. Gosse has recently³⁹ reported great improvement in a case of lupus in a child treated by subcutaneous injections of sodium morrhuate, and I had a lupus patient in India who improved greatly under the same treatment in the course of six months, and who subsequently cleared up nearly completely under inunctions of a mercury morrhuate made by Dr. S. Ghosh, so that the treatment promises better in chronic localized tuberculosis than in pulmonary tuberculosis with secondary infections, although I think it might be worth trying in addition to autogenous streptococcal vaccines made from cultures from the sputum in phthisical cases, for I have seen good follow the use of the latter treatment alone in several cases

of phthisis.

The Lethal Action of Sodium Gynocardates on Acid-fast Bacilli.—A very interesting and suggestive investigation of the effects of the sodium salts of the unsaturated fatty acids of chaulmoogra and cod-liver oils was published in March, 1920,⁴⁰ by E. L. Walker and Marion A. Sweeney, in which they recorded careful experimental proof that the sodium salts of my fractions B and C (the former consisting largely of hydnocarpates and the latter of gynocardates) were one hundred times as lethal as pure phenol to acid-fast bacilli as a group, including strains from rat leprosy and avian tubercle, while they had very little action on non-acid-fast bacilli such as the typhoid-coli group, thus showing a selective action on acid-fast bacilli as a class, which were killed on long exposure in fluid media in dilutions of about 1 in 100,000, and occasionally up to 1 in a million. On the other hand, they found no such action in the case of sodium morrhuate. Dr. Stanley Griffiths recently has kindly tried adding these substances to solid culture media, and he found that human and bovine bacilli grow well with the addition of a small percentage of sodium morrhuate, not quite so well with sodium soyate, while sodium hydnocarpate inhibited the growth of tubercle bacilli up to a 1 in 200 dilution, thus confirming the main point of the American workers. Walker and Sweeney also found that the salts of pure chaulmoogric acid had comparatively little action on acid-fast bacilli, but those of the whole of the fatty acids together were most active, which is in agreement with the recent conclusion of Dean that the ethyl esters of the whole oil are quite effective in leprosy. Separation of the different fractions is, therefore, unnecessary for the treatment of leprosy, which will greatly simplify obtaining active preparations on the large scale indicated by the success already obtained from their

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use in this widespread disease.

Walker and Sweeney suggest that the selective action of the soluble preparations of chaulmoogra oil is sufficiently great to explain their value in leprosy as a result of a direct destructive action on the acid-fast bacilli in the tissues, which may be helped by the organisms utilizing them in their metabolism of fatty acids, and they hoped to obtain experimental evidence of such an action in tuberculosis. This simple explanation, however, will not explain the important fact that sodium morrhuate, even on subcutaneous injection, undoubtedly produces febrile reactions with breaking up of the acid-fast leprosy bacilli with eventual recovery of the patients, in spite of its having no action *in vitro* on cultures of acid-fast bacilli as a class. Moreover, even in the case of the chaulmoogra oil preparations, their theory will not account for the severe and prolonged reactions sometimes following a few very small intravenous doses of sodium gynocardate, followed by gradual clearing up of extensive leprotic lesions in the course of a year without any further injections, which I have recorded. Such cases appear to be best explained on the theory that, during the extensive breaking down of the bacilli, antigens are formed, which bring about the subsequent prolonged improvement. I have for long considered that the action of the soluble salts of the fatty acids of the several oils I have shown to be effective in leprosy must, in some way, be due to a chemical reaction with the fatty acids in the coating of the acid-fast bacilli so weakening their protective envelopes as to allow the body-cells to deal with them, while the extensive breaking down of the bacilli in the body may lead to immunizing antigen formation in the system. Whatever the precise explanation may be, it is now abundantly clear that my discovery, that injections of soluble preparations of the fatty acids of chaulmoogra, cod-liver oil and

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soya bean oils lead to breaking down of leprosy bacilli in the human body, is of great interest and importance, and one which demands much further research.

Experimental Trial of Sodium Morrhuate, Sodium Soyate, and Sodium Hydnocarpate in Animal Tuberculosis.—On my return to England last year, I renewed my attempts to obtain experimental evidence of the value of my preparations in animal tuberculosis with the kind assistance of the Medical Research Council, to whom I am greatly indebted, and of Dr. Stanley Griffiths, who has placed his laboratory and his great experience of experimental tuberculosis at my disposal during five months' work at Cambridge, which I am glad to take this opportunity of gratefully acknowledging. As, unfortunately, the results have been entirely negative, they can be dealt with very briefly. In the first series rabbits were infected with 0.001 mgm. intravenously, or 10 mgm. subcutaneously, of a virulent fresh culture of bovine tubercle bacilli, so as to produce with certainty an acute general tuberculosis fatal in control animals within a few weeks, and either 0.5 c.c. doses of sodium morrhuate in 3 per cent. solution or ethyl ester morrhuate in 0.125 c.c. doses, respectively, injected intravenously. In this series both the treated and control animals died in approximately the same time. In another series guinea-pigs were infected by intraperitoneal injections of 0.01 mgm. of human tubercle bacilli and were treated by intraperitoneal and subcutaneous injections of 1 c.c. doses of a 1 per cent. solution of sodium morrhuate or of sodium soyate, but those treated by intraperitoneal doses died sooner than the controls as a result of adhesions and puncture of the bowel in the course of the repeated intraperitoneal injections, while no good resulted from the subcutaneous use of the drugs, for both the control and the treated animals died in approximately the same time of generalized tuberculosis

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of the type usually resulting from intraperitoneal infection.

Attention was next directed to a trial of the soluble chaulmoogra oil preparations, which have proved so useful in leprosy, and been demonstrated by Walker and Sweeney, now confirmed by Stanley Griffiths, to have a definite inhibitory effect of the growth of acid-fast bacilli including those of tuberculosis. As the sodium salts of the chaulmoogric acid series of fatty acids are too irritating to allow of their intravenous injection in such small animals as rabbits, ethyl ester hydnocarpate prepared for me in Calcutta by Dr. S. Ghosh, was used subcutaneously in them, while sodium hydnocarpate was injected intravenously in goats, whose large external jugular veins are very suitable for this purpose. In the case of the rabbits, it was found after death at about the same time as the controls, that much of the ethyl ester preparation had not been absorbed from the subcutaneous tissue, the absence of a layer of subcutaneous fat apparently rendering these animals unsuitable for its use in this way, although it is well absorbed in the case of man.

In the experiments with goats, two were used as controls and two for treatment, all being infected by means of a dose of 0.001 mgm. of bovine tubercle bacilli intravenously, although in one of the controls a part of it escaped into the subcutaneous tissue, with the result that the animal survived considerably longer than the others. In the treatment a 1 per cent. solution of sodium hydnocarpate was injected daily intravenously in doses gradually increased from 1 to 6 c.c., the full dose being about equivalent to the maximum dose for a man in proportion to the body weight of the animals used. No bad symptoms ensued beyond slight temporary giddiness with the maximum dose, as is also seen in man, while no sign of pain followed the injections. At the end of the

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first week of the treatment both the treated animals showed a high rise of temperature followed by a fall nearly to normal by about the time the temperatures of the control animals first began to rise steadily, which I hoped might prove to be a reaction followed by improvement, but once more the result was disappointing, for the temperature of the treated animals rose again, and they died of general tuberculosis about the same time as the control, who had received the full dose of tubercle bacilli into his veins.

The whole series of experiments, therefore, showed that each of the three drugs tried failed to influence the acute generalized tuberculosis, which results from the injection of virulent tubercle bacilli into the very susceptible animals used, while Dr. Griffiths informs me that it would be difficult to produce in animals, experimentally, the more chronic forms of tuberculosis, which form such a large proportion of natural infections seen in man, for the purpose of testing drugs on such mild forms of the disease, the failure of which, in the equivalent of acute general tuberculosis in man, is not surprising. Although, then, this research has failed to show any beneficial effect from the preparations tested in animals with extremely little resisting power to general tuberculous infection, it does not necessarily follow that they are all useless in chronic tuberculosis in the more resistant human species, while the success that has attended the use of sodium morrhuate in several cases of that particularly chronic tuberculous affection lupus, together with experimental evidence that chaulmoogra oil preparations at least are inimical *in vitro* to acid-fast bacilli, including all three types of tubercle, still leave ground for hope that further work on similar lines may, in time, lead to improvement in the treatment of at least the more chronic human forms, of which lupus and surgical tuberculosis appear to furnish the best

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field. On the other hand, I am now more doubtful regarding the advisability of the general use of these preparations in pulmonary tuberculosis except by experts under carefully controlled conditions, at least until further evidence is available regarding their value in more localized and superficial tuberculous affections, any reactions in which will be visible and easily watched. Such appears to me to be the position of the subject at the present time.

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The Protean Applications of Antigen Therapy in Practice.

By H. L. LYON-SMITH, M.D.

First Foulis Research Scholar in Pathology.

AS a firm basis to start with, we have Pasteur's early experiments on the subject of chicken cholera, and his success in prophylactic inoculations against it. Later on came Koch's great discovery of the bacillus of tuberculosis, and his successful efforts to immunize laboratory animals. Most of us can remember the terrible fiasco which occurred when he attempted to carry this discovery a step further, and apply it in the treatment of tuberculous cases. Poor patients rushed to Berlin in great numbers, and at home a number of men obtained tuberculin preparations and began to use them in practice, and in the majority of cases with the worst possible results. For, at that time, it was not realized that an individual already sensitive, or infected by a certain microbe, could be made much more sensitive by the injection of unmeasured doses. Then came Sir Almroth Wright's work at St. Mary's Hospital, in which by means of doses controlled by the opsonic index, which measured the individual resistances, he began to get results, using infinitesimal doses, which were undoubtedly beneficial.

About the same period our knowledge of colloid chemistry was increased, and in some of the experiments it was demonstrated that infinitesimal quantities

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(amounting to a billionth part) could entirely change the character of a colloid emulsion. I think this confutes the statements of several well-known writers that these infinitesimal doses of tuberculin could make no difference one way or the other.

One of the greatest hindrances to progress in inoculation treatment has been the general acceptance of what are known as "Koch Postulates," especially number 3, which states "that the isolated and cultivated organism on inoculation into a suitable animal should reproduce the disease." In certain diseases, *e.g.*, tuberculosis, typhoid fever, tetanus, plague, diphtheria, etc., specific organisms are responsible, but even in these maladies the so-called secondary infections are well-known to aggravate the primary infections, or even pave the way for them. The recognition of these secondary infections and their inclusion in the treatment has hitherto been largely neglected; *e.g.*, in tuberculosis, in the sputum, besides the tubercle bacilli, swarm pneumococci, streptococci, staphylococci, Friedlander's bacilli; and other organisms are frequently discovered, each of these being as destructive to lung tissue as the T.B. and entitled to be combined in the treatment of the case. Another argument against Koch's postulates is this. It has been shown that one organism instead of producing only one type of disease may be the originator of many. For example, staphylococci (of which there are numerous different strains), which are usually thought of as responsible for abscesses or boils, may also give rise to such varied pathological conditions as bronchitis, tonsillitis, ulcerative endocarditis, peritonitis, endometritis, eczema, osteo-myelitis, pleurisy, ulcers, urticaria, rheumatism (often of the chronic muscular type), cystitis, pyelo-nephritis, impetigo, and, especially in children, irregular forms of intermittent fever. I quote from well-known text-books

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such as Besson, Hiss and Zinzer, Lehmann and Neumann, through whose works these important clinical details are scattered. This fact complicates the diagnosis of infections enormously. It is impossible to state, simply from examination from a pathological exudate, all the bacteriological factors at work in a given case. The clues obtained by examination of fresh exudates are extremely valuable, but one has to bear in mind that certain areas may be affected by enzymes of bacteria situated at a distance.

For example, in cases of iritis, in one instance in particular, an arthritic patient developed acute iritis. He had widespread arthritis, most of the large joints being involved. I was asked to examine the patient's blood. I also obtained cultures from the prostatic mucus, and from the latter prepared a vaccine of streptococci and pseudo-diphtheroid bacilli, but was unable to grow any gonococci. But the blood-test made at the same time showed that the patient's red corpuscles hæmolyse quickly on being brought into contact with the gonococcus, and with several other bacteria, including streptococci of rheumatic origin, staphylococci, and his own cultures. A compound antigen containing small doses of these various organisms produced a rapid clearing up of the iritis as well as of arthritic condition.

The word "antigen," coined in laboratory work to indicate "any substance which gives rise to an antibody," was suggested to me by my old friend, Dr. Wyatt Wingrave, as a more expressive word than "vaccine."

Most of the tests for the presence of bacterial infections deal with the *serum* of the patient. A test, at which I have worked for a considerable time, consists in observing results which occur when a patient's own red blood-corpuscles, washed clean of serum and fibrin and made into a 5 per cent. emulsion with normal saline, are brought into contact with equal volumes of suspected organisms. I will quote one example only. In a large number of cases in which the patient had had at one time or other enteric fever, or had been previously inoculated prophylactically

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against typhoid fever, the red blood-corpuscles when brought into contact with an emulsion of typhoid bacilli underwent hæmolysis, whereas in a number of other bloods taken from cases in which there had been no known infection of typhoid, their red cells settled down in the test tubes, unbroken.

In some of the cases in which positive results took place, which occurred in many cases of chronic colitis, the patients were quite unaware of ever having had enteric fever, but we know that there are a number of cases of ambulatory typhoid, in which diagnosis does not occur unless a perforating ulcer develops and breaks.

Last year I submitted my test to the criticism of the Pathological Section of the Royal Society of Medicine, and it was received with hostile criticism from several of the pathologists present, not one of whom had apparently taken the trouble to investigate the test, and who rejected the clinical evidence which I proffered as "unscientific." Nor were they satisfied that my control was sufficient, although the tests they do admit are subject to the same objection, namely, there is no proof that their so-called controls are derived from the blood of *perfectly normal* individuals. The condition of the blood in every case is of the utmost importance. Red blood-corpuscles of healthy people, if washed free from serum and fibrin and kept in a citrated saline fluid of the right specific gravity, will keep their form for several days. But when taken from a case of severe infection, they rapidly disintegrate, and in these cases the clues obtained by the methods of direct hæmolysis are not reliable; at the same time if the examination has been made within a few hours of the withdrawal of the blood, and before spontaneous hæmolysis has begun, valuable clues may be obtained. In the technique of the test all substances which are known

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to produce hæmolysis—for example, distilled water, alcohol, lysol, &c.—must be most carefully avoided. Under these conditions when a specific reaction occurs with bacterial emulsions, all prepared by the same methods, if hæmolysis occurs, it may be regarded as a specific reaction between the toxin in the bacterial emulsion and the anti-bodies in the red cells. As a further step the test may be used quantitatively, and one may ascertain the weakest strength of bacterial emulsion capable of producing hæmolysis. This latter part of the test supplies a guide to the dose of antigen to be used in treatment. The initial dose must be 20 or 30 times weaker than the minimum strength producing hæmolysis. One may give, in most cases, large doses of the wrong vaccine with very little harm; but when a correct diagnosis of the infecting organisms has been made, then an overdose of the right vaccine will produce injurious hyper-sensitiveness, and may make the patient worse for a few weeks. This is well known, and has been the cause of a good many sound practitioners avoiding a form of treatment possessing these two-edged properties. It may be taken as a golden rule that the more intense the degree of infection the smaller must be the initial dose of antigen employed in the treatment.

I propose to quote briefly a few widely differing cases to illustrate the protean application of antigens. In the days when I was still somewhat sceptical of the value of vaccine therapy, I happened to say to Sir Almroth Wright, under whom I was working at St. Mary's, that he did not appear to believe in any diseases that were "non-bacterial." In reply he said: "Tell me of a single example in which you can absolutely exclude the bacterial factors." My impression at the time was that there must be a good many, but I could not quote them then, nor have

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I been able to find an example since, unless it may be in that group of cases, like beri-beri, in which some essential ingredient of diet has been lacking for some time.

In the majority of cases some depressing factor—chill, worry, neglect of or inadequate diet, or an accident—suddenly lowers the patient's natural resistance to some bacteria; or he may become infected by some microbe to which he does not possess normal powers of resistance. This will generally find its way to the most vulnerable part, or some tissue previously damaged. A sudden drop of temperature, from 80° in the sun to near freezing point, is an extremely powerful depressant, the influence of which has been proved by keeping a fowl, normally resistant to some bacteria, at a temperature near freezing point for an hour, and then inoculating it with this microbe successfully. Another pre-disposing factor is anæmia, but anæmia is really an indication of a vicious circle, the anæmia having generally been produced by some bacterial enzymes, especially those bacteria known to possess hæmolysins. Common sources of these bacteria are—

(1) In the pus from septic gums; pyorrhœa.

(2) The naso-pharyngeal mucus, especially from adenoidal cases.

(3) Intestinal mucus, as in cases of colitis.

Inoculated on blood-agar tubes or plates, their hæmolysing colonies may be recognized within 48 hours by the clear haloes surrounding them, the haloes being the result of the destruction of the surrounding hæmoglobin by enzymes given off from the colony.

The list of diseases taken haphazard from my case books includes the following:—(1) rheumatic fever, (2) pneumonia, (3) pleurisy, (4) bronchitis, (5) otitis media, (6) endocarditis, (7) peritonitis,

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(8) appendicitis. In connection with this latter affection it is very important to ascertain before surgical treatment the nature of the infection, and, if possible, get in two or three inoculations before the operation. In this way the fatal results which so often occur four or five days after an otherwise perfect operation might be avoided. The surgeon, who operates promptly, runs the risk of breaking through Nature's protecting barricade of active phagocytes. The same objection applies to any movements of the patient during acute stages. We know that natural efforts are made to close up an infected area, and to form a leucocytic wall, which may prevent escape of infection into the peritoneum. I would in all cases insist upon the danger of moving the patient even from one room to another before operating, *during the acute stages*.

In one case, which came under my notice, I was able, by rapidly performing a blood-test by direct hæmloysis, to identify a pyocyaneus infection, combined with pneumococci, staphylococci, and B. coli. The patient, invalided home from a Riviera hospital, had been nursing a French soldier wounded in the chest at Gallipoli, and this patient had a copious discharge of bluish green pus. I inoculated the patient with small doses of the combined antigens, with the result that the local condition subsided in 24 hours, and there was an enormous swelling at the site of the injection. Sir D'Arcy Power, who saw the case with me, then postponed operation for three weeks until acute signs had disappeared, when he removed a large appendix with a few recent adhesions, but full of thread worms. The patient made an uninterrupted recovery from the operation.

(9) tonsillitis, (10) laryngitis, (11) pyelo-nephritis, (12) cystitis, (13) jaundice, (14) puerperal fever, (15) osteo-myelitis, (16) dermatitis of various forms, (17) impetigo, (18) cerebro-spinal fever, (19) typhoid fever, (20) scarlet fever, (21) measles, (22) mumps?, (23) boils, (24) carbuncles, (25) disseminated sclerosis, (27) erysipelas, (28) poly-arthritis, (29) pernicious anæmia.

With regard to the last-named (pernicious anæmia), my

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experience has been limited to two cases, one which for a time improved to such an extent that for several months we thought he was cured, but he relapsed and eventually died, although, it must be admitted, that during the last few months efforts to procure more effective antigens were relaxed. The second case, a middle-aged lady, was a patient of Dr. Last's, of Littlehampton. He sent me up a specimen of her blood and a specimen of intestinal mucus, a specimen which showed that the patient was suffering from colitis. On blood-medium I discovered powerfully hæmolytic colonies, which proved to consist of streptococci and *B. coli* growing together. I made a vaccine containing about equal numbers of each. The specimen of blood arrived in bad condition, it was rapidly undergoing spontaneous hæmolysis, but by centrifuging and washing off the supernatant fluid, I obtained a few whole corpuscles, which hæmolyzed rapidly with T.B.E., *B. influenza*, strep. perodont. and *B. typhoid* with paratyphoid A and B. I sensitized her autogenous vaccine with anti-streptococcal horse-serum, and then made up a compound antigen containing 40 millions of the sensitized autogenous streptococci and coli, one three-hundred-thousandth of milligram of T.B.E. and 10 millions of each of the other three organisms, per c.c. The patient began with doses of 0.15 c.c. daily for four doses. The doses were gradually increased and the intervals gradually lengthened. Improvement began almost immediately. The blood-count (made independently), of which I have not the notes to refer to at the moment, showed erythrocytes below three-quarters of a million. At the end of six months they were four-and-a-half millions. Two years later the patient was quite well, but still asking for an occasional dose of antigen because the intestinal symptoms had not entirely cleared up. In this case, if my test gave a true picture, there was a mild infection by T.B.

Now many people have isolated foci of tuberculous nature hidden away in some mediastinal or mesenteric gland, which may be quiescent most of the time, but occasionally give forth an eruption of the various toxins, for tuberculin is a compound substance the elements of which are not of equal pathogenicity.

Another organism which possesses similar properties is the gonococcus, which, by the way, finds entrance to many victims by other than the usual channels, and plays a primary or secondary part in numerous diseases, especially in cases of arthritis, neuritis, iritis, etc. Since the days of Koch something like 400 pathogenic bacteria associated, according to Leymann and Neumann, with morbid conditions,

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have been scheduled, which makes it easy to explain failures which occur in the diagnosis of infections, and subsequent treatment, as of chronic headache. Many cases occur in people of rheumatic history, and I have seen benefit or cure result from inoculations based upon the blood-test referred to. But one can sometimes jump to a correct diagnosis.

A well-known man, who had been ordered to break off all work, cancel all appointments, and take complete rest for at least six months, once consulted me, before taking this step, concerning some subacute rheumatic condition. He happened to have a minute furuncle just inside one nostril, which caused a local annoyance. I inoculated him there and then with 500 millions of attenuated and partly sensitized staphylococci. The next day he woke, without any headache, after a refreshing night's sleep. Three or four similar doses cleared up his trouble, and did away with the necessity for an enforced idleness, which he would have found very irksome. I do not suggest that anybody may cure chronic headache if he finds a furuncle, but only quote the story as an example of the value of following up even the slightest clue.

The question of age is sometimes brought up. My experiences range from a patient eight months old to a considerable number of patients over 80.

An eight-months' baby had severe broncho-pneumonia. In a child of that age it is easy to see behind the epiglottis, and I secured a loop of mucus from behind the epiglottis, which, on examination, proved to contain great quantities of influenza bacilli and pneumococci. I saw the case with Dr. Barton, of Kensington. An inoculation containing half a million of each (sensitized pneumococci and sensitized influenzae bacilli) was given that evening. The cough was relieved and the child had a good night. The dose was repeated the following day, and three more doses were given, with a day or two interval between each. Dr. Barton found the lungs and bronchial tubes cleared up very rapidly, and the baby, instead of lingering several weeks, as these cases generally do, was practically normal within a week.

Diabetes is a condition in which my experience, since I returned to research work, has been extremely limited; but I know that one successful case had been published by Almroth Wright, treated with a *B. coli* vaccine.

My patient, a man of 54, had spent 28 years in Madras, and was discovered to have diabetes eight years ago. Last year he was

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advised to try antigen treatment by the Professor of Medicine at Madras University. He was well nourished but very pallid, and complained of severe headaches. His urine averaged 10 pints daily, ranged from 1030 to 1040 S.G., and the sugar-content varied from time to time, averaging 5 grains per cent., sometimes with traces of acetone and diacetic acid. He was on strict diet with "camouflaged" bread. The following investigations were carried out. The *urine* contained strep. fecalis in large numbers, B. coli, and a non-lactose fermenting coliform bacillus. The *intestinal mucus*, obtained by double colon irrigation, gave conspicuous numbers of strep. fecalis and B. pyocyaneus. His red blood-corpuscles hæmolyzed with these, and, in addition, with strep. parodont, staphylococci, gonococci, and polyvalent B. pyocyaneus. A compound antigen of these eight organisms was prepared, and a graduated series of doses begun. He soon began to improve, but on increasing the doses improvement stopped, and we returned to the smaller doses. He went to Harrogate and had Plombière treatment, but his diet was changed from the full ordinary diet which I had put him on, with no restrictions and with ordinary bread, to typical antidiabetic diet. His general condition began to get worse, and on his return he reported himself not quite so well, the urine again reaching 1030 and 1040 S.G. But on resuming ordinary diet, including *real* bread, and taking piperazine daily (which seemed to prevent the change of glycogen into sugar, and lessened the discomfort and distension of the abdomen from which he suffered at night), he quickly regained the improvement made at first. His report on his way back to India says: "Much less headache, tongue cleaner, pipe tastes much better, S.G. averaging 1024, in spite of all sorts of festive nights."

Sir Archibald Garrold foretold some years ago that the changes in metabolism associated with diabetes would probably come within the sphere of the bacteriologist rather than the pathological chemist!

Amongst the group of catarrhal cases amenable to antigen treatment may be included asthma, hay-fever, anosmia, and herpetic stomatitis. Asthma is due to a number of causes, which may be summed up by saying that any irritation of any branch of the vagus nerve may produce it. In my experience a highly irritable state of the naso-pharynx has been constantly present. Examinations of fresh films from behind the soft palate may give definite clues, and the use of autogenous vaccines, or carefully

prepared polyvalent catarrh vaccines, used in extremely small doses, will often afford temporary relief. There have been several cases in boys who have had asthma from infancy, and become cured, or practically cured, by a prolonged course of antigen treatment. In cases that do not respond promptly to the inoculations, a further search must be made for causes in the intestinal mucus, and by blood tests to discover whether latent T.B., or other factors, are present.

In hay-fever I have rarely found the St. Mary's pollen vaccine sufficient by itself. Even if the pollen test is positive, the coexistent chronic naso-pharyngeal catarrh has to be treated with antigens combined with pollen units. In one case of anosmia, a man of about 60, fond of good wines and good tobacco, had been unable to smell or taste anything for seven years. A pure culture of pneumococci was obtained from his naso-pharynx, and after three or four small inoculations he completely recovered his sense of smell and taste. He had chronic post-nasal catarrh as well, and this was very much reduced by the injections.

One of the largest groups at which I have worked consists of the various types of rheumatoid arthritis. In rough proportions the results have been, in over 1,000 cases: Class (1) much better, 50 per cent.; Class (2) considerably relieved, 25 per cent.; Class (3) abandoned treatment or were complete failures, 25 per cent. I have been unable to identify any one organism as the specific cause of rheumatoid arthritis.

The first case I investigated, some 11 years ago, was a lady of 63, who was reduced to the stage of crutches. I took cultures from the uterus, from the gums, and from the naso-pharynx. I isolated a Gram-positive diplococcus in each of these parts, and prepared a vaccine of the three strains. I also made a vaccine of staphylococcus aureus which was present in the uterine cavity, and I added a small proportion of B. coli, because at that time it was supposed to be the most frequent cause of appendicitis, of

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which the patient had several well-marked threatenings. *It is noteworthy that many cases of rheumatoid arthritis have had appendix trouble.* We began with very small doses, which aggravated the pains in her joints very sharply, but the patient found herself able to make several fresh movements, and was quite game to go on with the experiments, for at that time no cases had been published of rheumatoid arthritis treated by inoculations. She did remarkably well and still remains quite supple.

Many years ago Dr. Mantle, of Harrogate, published a paper on acute rheumatism, in which he isolated from the fluid in distended joints a small diplococcus. He also pointed out the frequency with which rheumatism began with a sore throat. Following up these suggestive observations, I make a point of examining the throat carefully for colonies of this diplococcus, which is easily decolourized when stained by Gram, and forms semi-transparent colonies which, on reflected light, are opalescent, or "pearly," and grown on blood-medium produce hæmolytic haloes.

This organism, together with staphylococci, *M. catarrhalis*, pneumococci, in fact, most of the catarrh-producing microbes, is invariably present.

A few years ago Dr. Warren Crowe drew attention to a large coccus present in the urine of arthritic patients, which he named *M. deformans*, which, morphologically, comes between the *sarcinæ* group and the staphylococci.

In the cases of rheumatoid arthritis one should suspect the presence of gonococci no matter what the patient's history may be, but I have not personally come upon a single case of rheumatoid arthritis due to this organism alone.

As an example of the usefulness of direct hæmolysis in treating rheumatoid arthritic cases, I will venture to report briefly a case of Dr. Cassels Brown, who was then practising at Rock Ferry.

He sent me a specimen of blood from a patient, aged 44, in bed with poly-arthritis, which had been going on for some months before, and appeared to follow on a severe attack of influenza. She

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rapidly got worse so far as stiffness, swelling, and pains in joints were concerned. He tried her with "Polyvalent Rheumatic Vaccine," constituents of which were not given. Finally, he sent me, in one of Allen and Hanbury's vacuum extractors, 2 or 3 c.c. of her blood. The red cells were centrifuged and washed two or three times with normal saline to get rid of all the serum, and a 5 per cent. emulsion was set up against 25 bacterial emulsions, selecting the most probable causes of arthritic trouble in my collection. Her red blood cells hæmolyzed in those tubes which contained staphylococci, influenza bacilli, and sensitized streptobacilli, obtained from the urine of many arthritic cases. A weak antigen of these constituents was sent. He reported improvement after three doses, and in nine weeks the patient was able to walk about the house. Her antigen was then reinforced, and *B. mucosus capsulatus*, *M. deformans* and *M. catarrhalis* were added. All her symptoms cleared up within five months and she was able to resume her work as a schoolmistress, but still having an occasional dose of her antigen. This was six years ago, and she still reports herself quite well although it is a long time since she has had any treatment. No clues were available in this case except the direct hæmolysis test.

A few more cases in which antigen therapy may be applied with success are prostatic enlargement, herpetic cystitis, pyorrhœa, chronic antrum infection, conjunctivitis, gastric ulcer, duodenal ulcer, colitis, tic dolooureux, fibrositis, and gout.

The latter, though some object to its inclusion amongst the bacterial diseases, is in many cases greatly relieved by vaccine treatment. In this affection the presence of chronic post-nasal catarrh, infected gums, chronic intestinal toxæmia, or some infection of the genito-urinary apparatus should be carefully looked for. The enzymes of the bacteria, which may produce this extremely painful malady, are carried in the blood to some part of the body which is undergoing strain. The joints of the big toe, perhaps, undergo proportionately more strain than any other joints in the body, and as a result of fatigue not infrequently become swollen, owing to serous effusions round the joint. These effusions become infiltrated by what are known as "lab" enzymes, which have the property of coagulating liquid proteids. The

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result is that the swollen joints are rendered very stiff and painful owing to the irritation of these toxins. "Lab" enzymes are produced by a number of bacteria, including pyocyaneus and many others. They are destroyed by a temperature of 70° C., but the utmost heat that a patient can bear is very much below this, so that the hot-water footbaths are hardly likely to give much relief.

In a number of cases of inoculations of a very complex antigen carried on over a prolonged period, I have seen gouty patients very much benefited, and instead of their diet excluding proteids, sugars, starches, alcohol, beer, stout, and port, I have found these stimulating foods extremely useful. Besredka has shown alcohol to be a safeguard against anaphylaxis, of which I propose to say a few words in conclusion. But before doing so I wish to defend the use of the term "fibrositis." It is often mistaken for arthritic conditions because of the frequency with which the fibrous tissues around a joint, or in its neighbourhood, become involved. Perhaps a better name for some cases would be "aponeurosis." The synovial membrane between the muscle sheaths in many cases becomes infected just as the pleura about an inflamed lung, for I do not think true pleurisy often occurs without some pre-existing inflammation of the lung itself. Superficially, in fibrositis, painful subcutaneous nodules may be felt over a considerable area, and in other cases one has to press more deeply before discovering them.

If space had permitted, I should have liked to give a table of different types of cases, with constituents, doses, intervals, and results, but statistics are not of very great importance in general practice, and the pure statistician as a critic of treatment has not the requisite knowledge for accurate evaluations. In our work no two cases are exactly similar. Even our

public health statistics, taken from the registration of deaths, cannot be regarded as infallible, for how many physicians, even the teachers in our great hospitals, can follow the case down to the post-mortem table, and in every case say, "I told you so." The great majority of death certificates are not submitted to the test of a post-mortem examination.

With regard to anaphylaxis, which means an acute *negative phase* set up by an inoculation, the symptoms are faintness, a breaking out into a cold perspiration, breathlessness, and a sense of extreme oppression. Sir Frederick Andrews described the mechanism most lucidly in his lectures on "Leucopenia." He showed that after sensitizing a guinea-pig with a small dose of a toxic vaccine, and then eight or nine days later giving an enormous overdose of the same vaccine, he induced the state which he termed "Leucopenia," because on examination of the blood in general circulation very few leucocytes were present, while in the lungs of the experimental animals there were enormous quantities of leucocytes which had escaped and were in the peri-vascular spaces, "resting like dogs which had overeaten themselves." Sir Frederick Andrews's doses of strong *B. coli* emulsion were strong enough to kill animals ten times the size of the guinea-pigs employed, so that his experiments only concern us because they afford some idea of what occurs when anaphylaxis (or, as some people term it, "proteid shock") is produced. I have not myself seen a single case but a few have been reported to me, generally with an antigen containing a non-gramming coccus, especially *M. catarrhalis*. I recommend patients to have an ounce of brandy at the time of an inoculation, especially when they reach the larger doses of the schedule. The most rapid way of relieving patients, seen during the acute stage, is to inject a third of

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a grain of morphia, followed by a cup of hot tea. Anaphylaxis does not occur as a result of inoculation treatment only. During a severe attack of pneumonia the patient may suddenly become very much worse, probably because a fresh area had become invaded, and a rapid increase in the amount of toxin present is giving the phagocytes such a surfeit as described by Andrews, that they swarm into such areas of lung tissue, as are still in action, for oxygen and rest. At such a moment the use of small doses of morphia, the free administration of oxygen and hot stimulating drinks, like tea, give more relief than anything else I know of.

In answer to the invariable question concerning diet and regime, I usually recommend:—

(1) In all cases to try and obtain physiological rest.

(2) Diet to be generous, rich in fresh proteids, such as underdone red meats, or even raw meat sandwiches, eggs, etc. Substances, in fact, which supply the blood with plenty of "complement."

(3) Unless the patient strongly objects, good port or burgundy, or stout which is free from the acidity of secondary fermentations.

Finally, let us bear in mind that wherever illness occurs, the first thought of the physician should be, "What is the bacterium concerned?" For, as anti-toxin for diphtheria often fails if too many days elapse before it is applied, with diseases for which we have no specific serum the longer the postponement of a bacterial diagnosis the greater the difficulty in obtaining effective treatment by antigens.

A "Course" of Vaccines.

By ARCHIBALD McKENDRICK, F.R.C.S., D.P.H., F.R.S., ETC.
*Joint Physician in Charge Med., Elec. Depts., Royal Infirmary,
Edinburgh, etc.*

THE fascinating problems associated with the subject of immunity have attracted numerous workers in this field. Toxins, toxones, agglutinins, opsonins, etc., have all been studied in detail, and out of these highly complicated and scientific investigations various facts have become more or less established. It is upon these facts that the principles of vaccine therapy have been based. Vaccine therapy is really an attempt at the practical application of these facts.

There is a real danger ahead—the danger of a divorce of the practical from the scientific. The same scientific spirit which is responsible for the production of vaccines is not being carried into their practical application. If this is not recognized and remedied, vaccine therapy in general will follow what has been the lot of tuberculin therapy, and Bier's congestion. These two therapeutic measures are of a highly scientific nature, but owing to a want of their scientific application, the practical results have necessarily been disappointing. It is not sufficient to know, even ever so minutely, the bio-chemical changes which will take place as a result of their application. The effects of these changes must be recognized in the patient *clinically*, otherwise it is quite impossible to regulate the dosage.

Nothing could be more unscientific, for example, than setting out to give a patient a prescribed "course" of vaccines by way of treatment. This

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is all too common, however, and is, perhaps, the most potent factor in bringing vaccine therapy into disrepute.

It is an absolute impossibility to tell beforehand how a patient will react to a vaccine. Each person has his own peculiar sensitiveness to each protein poison, and this sensitiveness or idiosyncrasy is not constant, but often varies even in the same person at different times.

In bacterial infections, it is the protein poison which gives rise to the signs and symptoms of disease. The poison so given off stimulates the elaboration of antibodies, and if there is a sufficiency of antibody produced, the disease undergoes natural cure. If, on the other hand, the amount of poison given off is too great, it may kill the person before antibody formation has had time to occur. It may even be that the protein-poisoning is so intense as actually to paralyse the elaboration of antibodies.

It often happens that the death-rate of the bacteria is just counterbalanced by the elaboration of antibodies, and so the disease becomes chronic. This is true of the great majority of diseases, because, if we except diphtheria and tetanus, the protein poisons of the bacteria are not given off during the life of the bacteria, but only after their death.

A patient's sensitiveness to the special protein poison is a measure of the antibody content of blood, and it is impossible to tell beforehand the degree of such sensitiveness. Further, it is impossible to estimate the exact amount of protein which will be required to stimulate formation of antibody.

It is for this reason that a preconceived, rule-of-thumb, "course" of vaccines is unscientific, and liable to lead to disappointment.

Inoculation of the proteins of dead bacteria (vaccine) stimulates antibody formation in exactly the

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same way as does absorption of the protein poison of the dead bacteria from the focus of infection. Too large a dose of vaccine will therefore have the same effect as too great a dose of poison absorbed from the focus of infection. The patient will become worse instead of better. Antibody formation may be paralysed instead of stimulated. Exactly the same applies to tuberculin therapy, and to the application of Bier's congestion.

When we examine this in terms of dosage, we find that the addition of even so minute a quantity as a ten thousandth of a milligram may convert an appropriate dose into an overdose.

Is this of itself not sufficient to make one hesitate before beginning the administration of a prescribed "course" of vaccine therapy?

It is quite true that the usually prescribed course is arranged on a scientific basis, but, unfortunately, it leaves out of account a consideration of the patient himself. One dose of a vaccine usually has the effect of raising the person's resistance against the infecting organism, and accordingly the prescribed course is one of gradually increasing doses.

What if the resistance is not raised by the first dose? In point of fact, it may be lowered, and the next dose, if given, will certainly further lower it, and so the patient is made worse instead of better.

I have had to dilute a vaccine ten times, and then a hundred times, so that the patient was only getting a thousandth part of the usual dose. The patient reacted even to this minute dose.

The dosage of any vaccine must be regulated by the reaction of the patient, and by this alone. The reaction may be focal, or constitutional. A focal reaction is exhibited at the site of the infective process, as a slightly increased activity of the disease. This corresponds with what is known as the negative

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phase, when the opsonic index will be temporarily lowered.

This is easily recognized if the lesion is superficial, but it has to be looked for if the disease is deep seated, as in the lungs. This increased activity will only last for a few hours if the dose has been appropriate. A constitutional reaction may be exhibited as anything from a slight feeling of "out of sorts" for a few hours to a severe constitutional disturbance.

A decided reaction should be an indication for diminution in, or even deferring, the following dose. The vaccine is intended to act as a reinforcement in antibody formation, and must accordingly be appropriate in time and in quantity, if good is to be done.

The application of Bier's venous congestion is practically analogous to the administration of a vaccine. There is a temporary increase in activity at the focus of infection. This results in a temporary increase in the amount of protein poisoning which corresponds with the negative phase. Then there is a gradual rise in the opsonic index.

Exactly the same phases are gone through after the administration of a vaccine.

If the practitioner who would employ vaccines had only the time and opportunity to study microscopically, and bio-chemically, the changes which he is producing in the body of his patient by their administration, it would be greatly to his advantage. He would soon begin to appreciate the enormous potency of a vaccine, and how a minute variation in the dose might influence for better or for worse the therapeutic effect. After he has come to regard a vaccine as a double-edged weapon, he will be much more successful in its use.

Why is Bier's congestion so seldom used now? For the same reasons that vaccines will probably

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become less popular in the immediate future, namely, because the dosage has been left to empiricism instead of being regulated by the reaction of the patient. The same may be said of the use of tuberculin. It is now discarded by all, save the few who are able to regulate its dosage. Personally, I have watched the progress of cases of tuberculosis of skin, bone, lungs, and glands under tuberculin treatment by a colleague, and seen uniformly good, one might even say brilliant, results. This has only been attained after many years of original research work in the clinical effects of stock vaccines. This same practitioner has, on several occasions, discovered clinically the primary infective organism in a local epidemic of "colds," or "sore throat," and named it to me, before I had verified it bacteriologically. How was it done? By taking a number of his patients who were affected, and by giving some of them a vaccine containing one organism, others a vaccine containing a different organism, and so on. He could pick out, from the various patients' reactions alone, the causative organism.

Unfortunately, there is no golden rule which can be laid down for the guidance of those adopting vaccine therapy. A mixture of brilliant results and dismal failures must be the lot of the beginner. The greater his clinical experience and acumen, the fewer will be his failures. It is to be hoped that this condemnation of the preconceived "course" of vaccines will, at least, have warned him of one of the many pitfalls.

A Misuse of Autogenous Vaccines.

By C. E. JENKINS, M.R.C.S., L.R.C.P.

Pathologist to Salford Royal Hospital, etc.

A NEW method of treatment passes through four well-defined stages. It is first ignored, then cautiously examined, and, if results seem promising, is taken up with a reckless enthusiasm and tried upon every sort of malady. Soon it becomes painfully clear that the new remedy is not a universal cure, and there arises a new school of opinion, the members of which are united by the common bond of a blind denial of every statement connected with the remedy. The follies of the enthusiasts have usually supplied their opponents with an abundance of ammunition. It is at this stage that the possibilities of the treatment first receive an impartial examination, undertaken to ascertain its uses and limitations.

Vaccine therapy has already passed this last stage, and its utility cannot be disputed. The broad principles that govern the use of vaccines are now well understood, but there is still ample room for investigation into the details of the selection of the type most suitable for different conditions.

That an autogenous vaccine is superior to a stock vaccine as a curative agent is well known. The latter is recognized as the proper type to use for prophylaxis, because one seeks to produce immunity against a disease which might be contracted at some future date. No exception can be taken to these truths in themselves, and, if the appropriate type was used in every case, the question with which

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this note deals would not arise.

It might be supposed that no very profound thought is needed to perceive whether the aim of administration is curative or prophylactic, yet it can be shown that there is at least one common malady that is frequently placed in the wrong category. Recurrent acute catarrh of the upper respiratory passages is much the commonest minor malady which is treated by vaccines. The sufferers from this complaint can be divided into two main groups. The first group is probably the smaller. In this the patients have a permanent chronic catarrh of varying intensity, and are subject to periodical acute exacerbations, usually brought on by climatic change or exposure. An autogenous vaccine is the correct type to use for these cases, because the condition is always present and the vaccine is required for curative purposes. The second and larger group comprises those persons who are usually free from any sign of catarrh, but who invariably "catch a cold" if brought into contact with anyone suffering from an acute catarrh.

An autogenous vaccine is frequently prepared for these cases. The time chosen at which to obtain the specimen for culture is during the height of an attack, or, at any rate, as soon after the acute stage as possible. In these circumstances the causal organism can usually be isolated, but it is important to keep in view two facts. The first is that the organism is the causal one of that particular attack. It affords no proof that future attacks will be caused by the same organism. The second point to be borne in mind is that the vaccine will be used for prophylaxis; that is to say, to prevent the patient contracting another attack in the future.

It may be conceded that if the patient should again be brought into contact with a case of catarrh due to the same organism, his resistance would be greater

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after a course of vaccine treatment. But if the vaccine is expected to confer an immunity against acute nasal catarrh in general, and wherever he may be exposed to infection, there follows of necessity the assumption that acute catarrh of the upper respiratory passages is always due to the same organism. Such an hypothesis is manifestly absurd, for it is an established fact that the identity of the predominant organism varies in different epidemics and even in the same epidemic in different parts of the country.

The autogenous vaccine under consideration would have no power to protect against any of the other organisms. A mixed stock vaccine is free from this objection. It is designed to protect against all the common catarrhal organisms, and is based upon the reasonable assumption that the causal organism of the patient's next attack will fall within its area of protection.

It is no exaggeration to say that it is a gamble to use an autogenous vaccine for the type of case described. It is also bad policy on general grounds, for, in addition to the defects already mentioned, it creates a false confidence which is usually followed by a corresponding degree of discouragement when its failure becomes manifest. This aspect of its failure is rendered the more prominent by reason of its special preparation, for the patient is likely to reason from the analogy of a suit of clothes—if the “made to measure” is a failure, what can one expect from the “ready made”? The virtues of the autogenous vaccine have been so firmly fixed in our minds that there is some danger of it becoming an obsession, leading to a failure to distinguish clearly the essential differences between curative and prophylactic vaccines. There are no more complex therapeutic agents than vaccines, and a closer study of them, from the standpoint of what they are required to do, will repay the prescriber.

The Use of the Constant Electric Current in Treatment.*

By A. R. FRIEL, M.D.

Aural Specialist, Ministry of Pensions Boards, London District.

IT is only comparatively recently that the treatment of patients by the constant electric current has been placed on a sound basis, and for this we owe a debt of gratitude to Professor Leduc, of Nantes, who, by experiment and by the application to patients of what he learnt by experiment, has furnished us with guides both in theory and practice.

When a salt, such as sodium salicylate, chloride of sodium, or zinc sulphate, is dissolved in water it partly splits up into its ions, which are the acid and basic radicles plus an electric charge. If wires attached to the terminals of the electric battery are now dipped into the solution, owing to the electric charge present on the radicles a definite movement of attraction, or repulsion, is imparted to them. The electric current of the battery does work. We are accustomed to see work done by the electric current in other ways, *e.g.*, a motor revolving, a lamp-bulb lit, but here the work done is the definite movement given to the ions. The basic radicles, zinc, copper, sodium, etc., are positively charged, and therefore they are repelled from the wire attached to the positive terminal, and attracted towards the wire attached to the negative terminal, and the acid radicles, chlorine, salicyl, and

* Based on a paper read before the Hunterian Society.

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sulphuric travel towards the positive pole. It is owing to this travelling in a definite direction that ions can be made to pass from one solution to another contiguous solution or, from a solution in contact with the surface of the body into the body.

New chemical compounds arise owing to the introduction of foreign ions, and these compounds are soluble or insoluble. If they are soluble, they are carried over the body by the lymph and blood stream, and can produce general, as well as local, effects. If the new compounds are insoluble, they remain where they are formed, and the effect is strictly local.

In addition to these changes there is another, namely, the bodily transfer of water from the positive to the negative side, so that there is diminished water at the region of the positive pole, a drying, or dehydration, and an increase of water, an hydration, and consequently increased solution, in the region of the negative pole.

We have, therefore, to consider the effect of the constant electric current in treatment under three aspects :—

1. The changes and effects, both general and local, which take place as a result of the introduction of foreign ions into the body. This aspect comes specially into prominence in the treatment of pain by ionizing with sodium salicylate, and in the treatment of local sepsis by ionizing with zinc.

2. The metabolic or nutritional changes which are produced by the exchanges of ions between a cell and its surrounding fluid under the influence of the electric current. This is made use of in the treatment by ionization of disturbances of the brain.

3. The solvent effect referred to above, which helps to explain the good result that follows the treatment by the constant current of exudations in sprains and of thickening around joints as a result of injury or

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disease.

Although *general* effects may be produced on the body by the introduction of foreign ions, it is especially the *local* effect which is aimed at in this form of treatment. We apply the treatment to the part affected. The relief of pain is one of the tasks we have most frequently to surmount. If the cause of the pain is at the place where the pain is felt, treatment by the introduction of the salicyl ion is often effective.

One of the most severe cases of pain that I have personally seen, and one in which the relief was most remarkable and complete, was that of a man suffering from a gunshot wound in the back of the lower part of the leg. The mere sight of anyone coming near him to dress him threw him into agitation, and the actual dressing of his wound was agony to him and distressing to everyone in his neighbourhood. He was taken, with much alarm on his part, to the ionization room and his leg placed in a bath of a solution of sodium salicylate in warm water, and his leg was ionized for an hour. That was the end of his agony.

This is an illustration of the success to be attained if conditions allow you to get at the spot. The same immediate measure of relief is not to be expected by a case at the other end of the scale, such as a case of sciatica, where thick layers of fat and muscle intervene between the electrode and the inflamed nerve.

The more superficial, and therefore the more accessible the situation which we have to treat is, the more likely we are to be successful.

Many slight injuries and sprains with resultant "thickening" in the neighbourhood of joints often incapacitate people for longer or shorter periods. These yield to ionization. There is a striking experiment devised by Professor Leduc which leads one to believe that in addition to the nutritional changes

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which occur from the exchange of ions as the result of the current between cells and the fluid in contact with them, there is also a transfer of water from the positive to the negative side, and an increased solubility of exudates there.

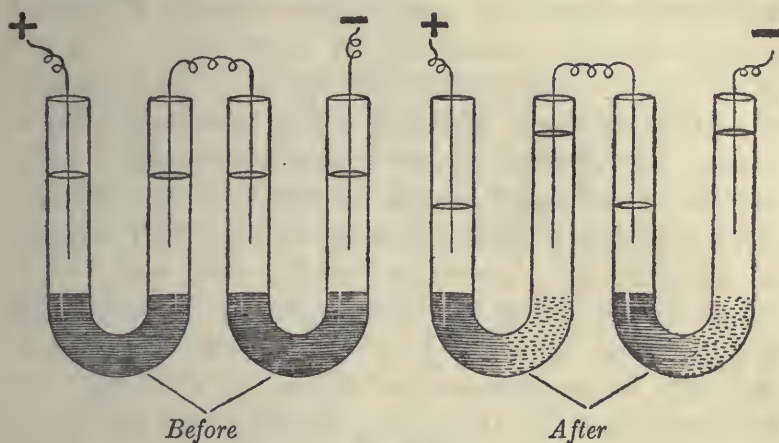


FIG. 1.

Some white of egg is introduced into the bend of a **U**-tube and coagulated by immersion in boiling water. A solution of a salt is then poured into each limb and a current of electricity passed through the tube for some hours. It is then seen that the fluid has sunk on the side connected with the positive pole and risen on the negative side, and, moreover, the albumen on the latter side is dissolved.

What is the effect on healthy tissues? The same, but to a lesser extent. Owing to their being well supplied with blood vessels the increased fluid is rapidly removed. An exudate, on the other hand, since it is not able to dispose at once of the increased fluid is more or less dissolved, and so can often be soon entirely dissipated. The duration of the application should be long, the current strong, and several sittings may be necessary.

A little more must be said about the application of the current and of drugs to deep tissues such as

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the hip joint or the sciatic nerve. The problem is composite. When we analyse it, it will appear more simple. Suppose we apply one electrode to the gluteal region, and another to the chest, or the other leg, with the hope of introducing the salicyl ion into the deep structures, say, of the hip joint, or the structures near it, such as the sciatic nerve. If we stood on a railway platform, and looked across to the other platform and thought of crossing, while a number of slowly moving trains were passing in a continuous stream through the station, we would, to cross over, enter the compartment of one, pass through it and enter a compartment of the next, and so on. When we had crossed all the trains should we arrive at the other platform? Probably not—we should probably be beyond one end of it. So when the ions are introduced into the skin, many enter the blood vessels and are carried along and reach a point, which is not where we hoped to place them.

Again, take another illustration. Suppose we wished to pour water from a jug into a basin and, as we did so, somebody held underneath the jug a gutter which deflected the water and carried it somewhere else, the water would never reach the basin. So, when we think that our current may pass through the hip joint, we may overlook the fact that a good conducting layer is interposed between the skin and the joint, namely, a thick layer of muscle. This diffuses the current, and so the hip-joint is shielded from it.

Thus, it is unlikely that we can exert such influence on structures deeply placed beneath muscles (1) by the introduction of ions into them, or (2) by the interchange of ions between the cells of the deep structures and the fluids around them.

This is the reason why treatment by ionization is not so effective in the hip and shoulder joints as

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in the knee, fingers, wrist and elbow.

We will now pass to another branch of the subject, in which the results are often so brilliant that they may be spoken of as perfect. I refer to the treatment of local sepsis by zinc ionization.

Let me describe the laboratory experiment devised by Professor Leduc, which is the keystone of the arch on which the success of the treatment of local sepsis by zinc ionization rests. A glass trough is filled with serum and into it three wires—one of iron (A), one of copper (B), and one of zinc (C)—are dipped, while a rod of any metal (D) is connected

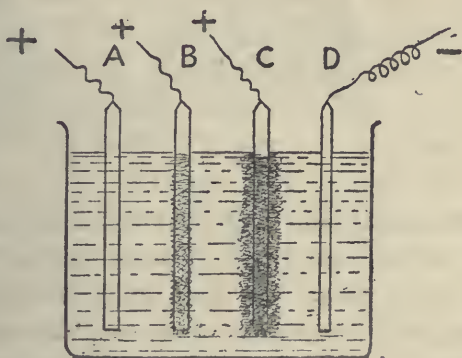


FIG. 2.

with the negative pole of a battery. Each of the wires is connected in turn with the positive pole, and the current allowed to flow for a time. It will then be seen that no clot is formed round the iron wire, a soft scanty one round the copper, but a firm large one round the zinc, and so firmly does it adhere to the wire that when this is lifted out of the serum the clot comes with it. Thus the zinc ion is a great coagulant of albumen.

Cells—tissue cells or bacteria—are composed of albuminous substances, and their coagulation involves their death. The author varied Professor Leduc's

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experiment thus—

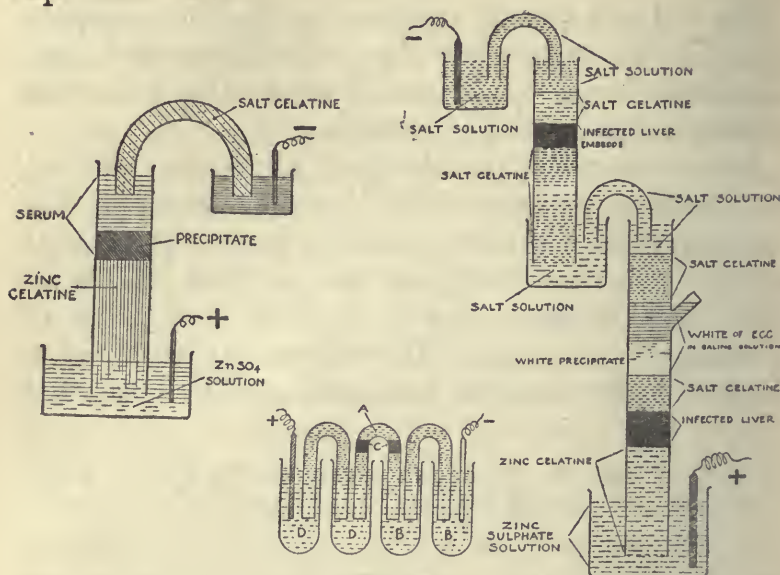


FIG. 3.

On the left, we see the zinc ion producing coagulation in a layer of serum, resting on gelatine containing sulphate of zinc, when the current is passed through. Mere contact even for days between serum and zinc gelatine (isotonic with the serum) produces no appreciable change. The sharp delimitation between precipitated and unaltered serum explains the absence of irritation of deeper tissues when the surface of an ulcer, for example, is exposed to zinc ionization.

In the centre is an illustration of an experiment designed to show the killing of bacteria in a blood-clot (C). (A) is salt gelatine, (D) zinc gelatine, and (B) salt gelatine; on the right the killing of bacteria in tissue. The liver of a rabbit was infected by the injection of a gas-producing bacillus into the vein of the ear. The portion of liver, which was treated with zinc, when transferred to a tube of broth culture medium and incubated, produced no gas, while the control subjected to ionization with sodium (from

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the salt) gave abundant gas.

There is no selective action on the bacteria in these experiments. Tissue cells as well as bacteria are permeated by the ions. Zinc ionization is a method by which bacteria in an albuminous matrix can be killed—it is a sterilization procedure, comparable to other sterilization procedures, such as when instruments are boiled prior to operation or the skin is painted with Tr. Iodi. It is not a method for producing immunity.

When we come to apply this knowledge to the treatment of disease in patients, we recall the fact that, in the laboratory, we arrange our experiments to give a clear answer to a problem made as simple as we can make it. Simple in the sense that only one factor is dealt with at a time, so that the result may appeal convincingly to our judgement. But in the treatment of patients, conditions are imposed on us; we have to analyse the disease, know what the various factors are which enter into it, and take them into account as well as the factors present in the remedy, drug or procedure—or both—which we intend to apply.

As illustration, we will take one concrete example of disease—one which is frequently met with—in which the conditions can be seen and easily investigated, and in which the results of treatment by ionization are clear and easily verified. I will then refer to some other common diseases without entering into full details. The one I wish to deal with specially is chronic suppurative otitis media.

Acute suppurative otitis media and chronic suppurative otitis media are two distinct diseases—different in their cause, course, result, and treatment. When a slide is made from the discharge in a case of the acute disease it is seen that one organism alone is present, *e.g.*, a pneumococcus or streptococcus. If in-

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sufficient care is taken in the treatment, the discharge becomes infected with organisms from the skin, and it is this infection of the discharge which is the usual cause of chronicity. In the acute case, we may regard the *tissues* as being attacked. After a struggle, they usually repel the germs. In the chronic case we have the *discharge* contaminated and broken down, and we have a “confection,” to borrow an expressive term, of broken-down serum, disintegrated leucocytes, bacteria and their products in contact with the tissues which they irritate, and which respond by secreting pus.

With this explanation we may state that the factors which concern us in regard to the treatment of

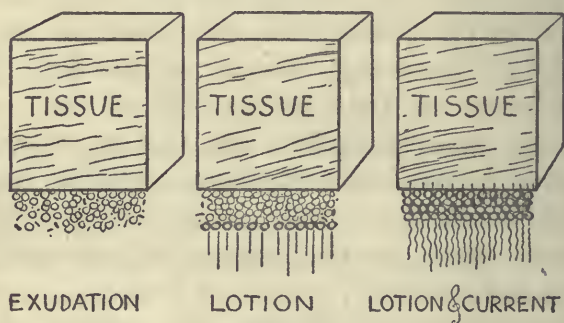


FIG. 4.

uncomplicated chronic suppurative otitis media are :—

- (1) The infection is of an albuminous fluid.
- (2) The infection is outside the tissues; and
- (3) The wall of the cavity containing the “confection” consists of living tissues.

What does this “infection of the discharge,” deceptively called “mixed infection,” indicate? Stagnation of the fluid exuded, which in turn indicates structural or mechanical conditions of the cavity which favour that stagnation.

By what is called drainage we deal with the accumulation of considerable—macroscopic—quantities of

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fluid. We do not deal with the microscopic layer of serum and bacteria adhering to the surface of the tissue. For this ionization with zinc is an effective method of treatment.

Contrast the action resulting from mere contact with that produced when the zinc is made to permeate the exudation by the current.

Some attention must be paid to the tissues forming the wall. They consist of mucous membrane covered with epithelium, and the surface, though uneven, is smooth. We bear in mind that the mucous membrane is a living organ, and that we should neither irritate nor damage it; that its epithelium is the great natural barrier which protects the tissues from infection, and lastly, that the "confection" is outside the tissues though in contact with them. From all this it follows that the dose should be moderate, and from the results it is seen that moderate doses are effective.

When an ear, presenting the conditions such as I have described, is examined within 24 hours of treatment, it is often found that the suppuration has entirely ceased. The ear is dry, the drum is clean and the mucous membrane is pale. It is this rapid and complete subsidence of suppuration that serves as a criterion for assessing the value of zinc ionization.

A few illustrative cases out of many are submitted.

Age of Patient.	Ear.	Patient states duration of discharge.	Diagnosed cause of chronicity.	Treatment.
21	L.	8 years	Tympanic sepsis.	May 13. Zn. Ion 3 ma 15 min. May 17. No discharge.
17	R.	11 days	Do.	May 20. Zn. Ion 3 ma 10 min. May 27. No discharge.

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Age of Patient.	Ear.	Patient states duration of discharge.	Diagnosed cause of chronicity.	Treatment.
29	R.	Years	Tympanic sepsis.	May 4. Zn. Ion 3 ma 10 min. May 18. No discharge.
7	R.	10 days	Do.	April 5. Zn. Ion 3 ma 10 min. April 12. No discharge.
31	R.	2 months	Do.	June 24. Zn. Ion 3 ma 10 min. July 1. No discharge.
29	L.	3 weeks	Do.	Oct. 18. Zn. Ion 2 ma 15 min. Oct. 28. No discharge.

It is not, however, every case of chronic otorrhœa which will show this result. When the mastoid is infected, it is usually not possible to introduce the fluid and distribute the current to the whole of the infected area. Again, the presence of polypi and granulations which exude fluid, which it is impossible to keep sterile because it is in contact with the air, point to the necessity of first getting rid of the polypi and granulations before attempting ion zation. The exclusion of these conditions—polypi, gra ulations, and mastoid disease—may seem to limit the usefulness of zinc ionization in chronic otorrhœa, but what I have stated gives an idea of the difficulties to be overcome in curing a patient, and indicates the conditions for the employment of a remedy which yields results more brilliantly successful than anything else I know of in surgery.

Similar conditions occur in other parts of the body besides the ear, *e.g.*, chronic endometritis and pyorrhœa alveolaris. Here, let me call attention to the work

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of Dr. Samuel Sloan, who died a few months ago, and who had the great satisfaction of knowing that he had helped to introduce a form of treatment calculated to save countless numbers of women from chronic discomfort and ill-health; and also to the work on pyorrhœa of Dr. Sturridge, who has analysed the condition, and indicated the procedures necessary to cure suppuration around teeth.

In sinuses and ulcers, the surface is covered, in contrast to what occurs in the case of the ear, with ordinary granulation tissue; in abscesses with what is called the pyogenic membrane. There is no epithelium, the integrity of which must be respected, forming an efficient barrier between the outside world and the tissues. Consequently, it is quite safe and, indeed, desirable to give a larger dose than was the case in the ear. In sinuses and acute abscesses it is well, if possible, to close them, so as to avoid reinfection. In some ulcers and wounds this is impossible, and so it is necessary to take special precautions to avoid reinfection from the neighbouring skin.

In many forms of disease ionization is an easy method of treatment to adopt. In others the mechanical difficulties are so great, *e.g.*, in comminuted fractures, that it is impossible. In others, a certain amount of thought, ingenuity, and trouble are required. In many cases the cure of the patient depends on the doctor into whose hands he falls. It is a truism to say that the cure of the patient is the triumph of single individuals. It is so in every sphere of effort. Whether we are politicians, engineers, soldiers, or doctors, the victory is the work and the reward of the man, the individual.

Instinct and Conflict.

By ERNEST W. JONES, M.D., M.R.C.S.

M.O. Ministry of Pensions, Neurological Clinic, Birmingham.

THE study of life, as of all phenomena, is always an attempt to reduce the problem to its simplest elements. A very superficial study of biological phenomena shows us that there is a trinity of factors beyond which, as biologists, we do not find it profitable to go; these are Matter, Force, and Mind. Attention in the past has been directed too exclusively to the reduction of all biological phenomena to terms of physics and chemistry; to-day the study of mind is coming into its own, and we are passing out of the age of pure materialism.

The mind can aptly be compared to the sea, the surface of which is continually altering, not only because of external influences such as that of the moon, etc., but also because of conditions below the surface such as currents, submerged rocks, etc.; so the surface of the mind, consciousness, is continually being modified, not only by impressions from without, but also by factors lying deep below the surface, in the unconscious.

Psychology is concerned with studying the causes that affect consciousness; it is the scientific study of behaviour. All phenomena of life are the expression of certain tendencies to action and their modification by external conditions. These tendencies are seen throughout the animal world and are called the instincts, and all forms of biological activity can be analysed in terms of instincts. In the behaviour of animals, the primary instincts can be studied in their

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most primitive form. In man, the instincts, fundamentally the same, are evolved to a higher state of complexity. The highest expressions of human endeavour are based on these primary instincts, the mainspring and the driving force of all activity. Human instincts not only become more complex, but also combine to produce greater variety of behaviour, associated with emotions of a more highly developed character. Thus, human conduct can be analysed.

It is to McDougall, I think, that we owe the most complete and rational classification of these instinctive tendencies. He reduces behaviour to eight or ten primary instincts, and although I think that these definite entities can be distinguished and described, yet we must not regard them of sudden appearance in the drama of evolution, but rather as evolutionary products that have had small beginnings.

The great instinct of fundamental importance is, undoubtedly, the reproductive or sex instinct. The biological impulse behind all life is obviously the urge to carry on the species, and everything in life is subservient to this creative energy; without it, the continuity of life could not be maintained. Although Freud and his school have been censured, possibly with justice, for placing an exaggerated importance on the sex impulse in all normal and abnormal manifestations, yet there must be enormous truth in his main idea. The manifestations of the sex instinct are well known, and are the vital principle in much of the creative work of artists, poets, and others. Factors connected with this instinct are of the first importance in many neuroses, though I consider not to the degree that is maintained by Freud and his school.

Another instinct of equal biological importance is the alimentary instinct, and here I would draw attention to the fact that we take food because we like it and not because it does us good. The same with

all the instincts; they are gratified because of the impulse or desire that is there, and the biological need is only discovered on intellectual consideration of the subject.

The third great instinct is that for self-preservation, which prompts us to flee from and to avoid danger, and with it is associated the emotion of fear. Obviously, if this instinct did not exist, we should all of us have died out long ago. The tremors associated with increased muscular excitability, the pallor due to the contraction of the peripheral vessels, the increased action of the heart, are some of the physical manifestations of fear, and are all directed to increase the power of flight. Under the influence of this emotion, prodigious feats of physical strength are performed, and even the seemingly impossible has been attained at times. The nervousness experienced by public speakers, actors, and others, is a manifestation of this instinct with its attendant emotion. With this is also associated the instinct for concealment, as shown by the way some of us, against all reason and the canons of common-sense, bury our heads under the bedclothes during a thunderstorm at night, and also in the way that soldiers, when in a state of panic, dive into dark dugouts or under their beds during an air raid.

These three instincts—the reproductive, the alimentary, and the self-preservative—are the great primary instincts that have the larger share in determining our actions and our thoughts. There are others, too, which can be differentiated, although primarily developed from these three, and which are of great importance in determining human behaviour.

There are the instincts of self-display and of self-abasement. They are to be seen in all the more highly-developed animals, and are in direct antagonism to each other. The instinct of self-display can be seen

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in the prancing horse, in the sense of superiority with which a Newfoundland will contemplate a Pom. In man, this instinct is largely concerned with ambition and the desire to be a success in life.

The instinct of curiosity, which is associated with the emotion of wonder, seems to be a definite entity. It is excited by anything unusual, but not of a sufficiently alarming character to induce flight. Who has not seen a young puppy advance towards a wasp, suddenly start back, and alternately advance and retire, thus showing the alternate stimulation of his instincts of curiosity and fear? Curiosity attains a high development in those who devote their lives to research, and, for example, face the dangers of the Arctic cold. This instinct, with its emotion of wonder, also enters very largely into religious speculation.

Another vital instinct of a rather different character, which tends to dominate the situation whenever any other of the great instinctive tendencies is thwarted, is pugnacity. It is specially manifest in animals when the sexual instinct is denied its natural expression, and is also closely connected with the maternal instinct. Under this compulsion, the most timid animal will show a courage that is surprising. Who has not heard of the prowess of the stag at bay when flight is useless, or of a lioness defending her cubs?

The parental instinct is one of great social importance. It is of late development biologically, and the more limited the progeny of the animal the more it is intensified. With it is associated the highest of human emotions, love, and out of it develop the most altruistic feelings and actions, all that is best in the world; it is one of the great moving forces behind true religion, and has dominated the lives of the greatest reformers.

There are still other instinctive tendencies: the acquisitive instinct is significant in much of social life

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to-day, with its worship of Mammon; the miser's hoard, or even the collection of old furniture and curios, are instances of the impulse, which makes the squirrel hoard nuts or the dog bury his bone.

Then there is the instinct for construction, such as makes the bird build its nest and the altruist the League of Nations, and probably many others which it would not profit us to consider further.

The gregarious, or herd instinct, that has made animals congregate together in order to be strong in attack and in defence, is of great social importance. Civilization could not have arisen but for this. An individual is an entity whose actions are all expressions of his primitive tendencies; but when individuals are congregated together, it follows that, if they all strove without restraint to follow their urgent desires, they would soon fall into conflict with their fellows, and the advantages of co-operation in the herd would be nullified. Thus the individual is forced to conform to restrictions for the benefit of the majority. This restraint is at the basis of the herd instinct, and out of it grows social order and morality. The solitary animal cannot be immoral. The depredations of the family cat are not immoral, but unmoral; but those of the dog, with his herd instinct highly developed, are of a different order. The cat that walks alone has not the moral sense of the dog, in whom the instinct of self-abasement is seen in a dejected appearance when he has been found out in a too evident outburst of his primitive impulses.

These, then, are the instinctive processes to which all human conduct can, by analysis, be reduced. Most human actions are of a complex character, that is to say, they are the combination of a number of these instinctive forces pulling in various ways. The love of a man for his wife is not the simple expression of his sex instinct, for with it is

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often united reverence and other emotions of a more developed kind. Instincts are thus often combined to produce something of a higher character, but the reverse commonly occurs when instincts are in direct opposition. When this takes place, there is a state of conflict, and on the outcome of the conflict depends the mental wellbeing of the individual. If a satisfactory compromise is attained, the individual is well and happy; if it is not satisfactory, mental unrest follows; if the conflict is violent and severe, and neither side wins, a neurosis results, and in extreme cases there may be complete breakdown in the adjustment to life, producing insanity.

Let us take a familiar example—the soldier. In him is the same tendency to flee from danger as in every one of us, but, under the influence of the herd instinct, his social impulses keep it in check. In his training, every effort is made to excite his pugnacity against the enemy, and various influences are brought to bear to subdue completely the basic primitive aversion to face danger. In a life of hardship, the fear impulse is stimulated by the actual presence of danger, and the controlling influence, his moral tends to diminish, and when the forces pulling him in opposite directions become approximately equal, his mind comes to be in an acute state of conflict. He can neither hold out against the increasing sense of fear, nor run away. If he is wounded, the conflict is for a time at an end; but, if not, a neurosis is bound to develop. We all know of countless examples of war neurotics, the origin of whose trouble can be explained in this way.

Take another example—the conflict between the instincts and emotions of mother and child. The mother, with her maternal feelings strongly developed, protects the child. The child, as he grows up, desires to leave the parental nest to see the world for himself,

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to express his own individuality, and assert his own independence. If the mother-influence is overwhelming, it follows that the child cannot learn to stand on his own feet, and there results the "mother's darling" type, the namby-pamby youth. Lack of confidence, shyness, is often due to this same factor in a lesser degree. Suppose, on the other hand, the individuality of the child gets the upper hand and he bursts his bonds; this is invariably accompanied by a lack of affection for the mother and may even amount to a positive dislike, and much of the misunderstanding between parents and children can be explained in this way. Suppose that neither gains the upper hand, mental unrest and neurotic symptoms necessarily follow. These principles have even a wider significance. The sex instinct is the strongest of all; this, for the benefit of the herd, must be kept rigidly under control. The compromise, satisfactory to the individual and to civilized society, is marriage; but if the compromise is not attained, and the instinct is not restrained, whilst its satisfaction is only obtained in an anti-social way, damage to the community results. If there is an ever-increasing proportion of such individuals in a community, the herd breaks up. This is one of the great factors in the downfall of nations. If the instinct is too strong, and is denied natural expression or outlet in any form of work that forms a satisfactory solution of the conflict, a neurosis results, which is an unsatisfactory solution of the otherwise insoluble conflict.

Thus the study of the instinctive tendencies, with their accompanying emotions and conflicts, is at the basis of a right understanding of the drama of life, and we must look to psychology if we are to grasp the problems of the individual of to-day, or the problems of humanity of all time.

The History of Tuberculosis.

By ED. CURETON, M.D., M.R.C.P.

Consulting Physician, Royal Salop Infirmary, Shrewsbury.

I N the June, 1921, number of THE PRACTITIONER, there appeared an article by Dr. Syme Thompson, and in an otherwise very interesting paper, towards the end, he says—

“the credit for starting the first sanatorium belongs to Herman Brehmer, who opened an institution at Görbersdorf in the Waldenberg Mountain during 1859.”

Mention is made of George Bodington's paper published in 1830, but no mention is made of the fact that Bodington started, in the little village of Sutton Coldfield, an establishment for the reception and treatment of “consumptives” prior to this date, but so hostile was the medical profession then to his methods of treatment that its author was considered a little better than a lunatic, and

“however resolutely he maintained his position, however firmly he supported his ideas, disapproval so universal drove patients from his establishment, where, several years previous to the publication of his essay, he had acted according to his principles and effected many cures. He finished by giving up the curing of consumption and transformed his hospital into a lunatic asylum.”

This last quotation is from Dr. Carlo Ruata's book on pulmonary tuberculosis, published in 1901.

Practical Notes.

Treatment of Hay-fever.

Flaudin considers that, from a practical point of view, hay-fever must be looked upon as a manifestation of an anaphylactic shock in a subject sensitized to the pollen of grasses, and that the crisis is not enough to desensitize the patient. Taking this idea as his leading mark in the treatment of the affection, he believes that it explains the failure of all the local applications, which lessen the local symptoms but have no effect at all upon the general cause. It is the reason for the usual non-success of vaccination—more correctly of anti-anaphylaxis. The injection of small doses of pollen with the object of desensitizing the organism has very little chance of success. As a matter of fact, the re-introduction of pollen into the organism does not desensitize, for during the whole of the hay season, the most severe manifestations of shock bring no secondary relief. It would be daring to expect that the substitution of the subcutaneous or the intravenous way of entry for the absorption by inhalation would modify the mode of action of the substance employed. Practically, treatment by vaccination is only exceptionally successful, and has been given up in France.

The good results obtained by the use of peptone in the treatment of alimentary urticaria and of certain migraines, according to the method of Pagniez and Pasteur-Vallery-Radot, suggested its trial by injection to Flaudin, and the results appeared to be slightly encouraging, but the more logical method seemed to be serum therapy. Those sera prepared by injecting pollen into animals were not without effect, but the benefit was only relative, and the patient was exposed to the classical serum symptoms, so that they could only be used with great care.

The observation of profound changes in the blood in hay-fever, and the development in the blood-serum of *crypto-toxic* properties, using Achard's happy expression, suggested the use of the blood of the patient himself for the therapeutic object. It is known that a massive re-injection of blood, or of blood-serum, is capable of setting up more or less severe shock with hæmoclastic symptoms. Widal and his followers have shown what can be done in conditions of great diversity of appearance by "treatment by shock." Flaudin concluded that for such treatment to be of effect in hay-fever, a desensitizing material opposite to its *crypto-toxic* properties should be obtained from the blood, or blood-serum, and this he endeavoured to obtain.

The technique is quite simple. 20 c.c. of blood are obtained

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aseptically from a vein in the fold of the elbow of the patient. After the serum has separated from the clot, it is decanted at the end of about twenty-four hours into sterile tubes. The day after the blood has been taken, or six hours later at least, $\frac{1}{4}$ c.c. of serum is injected subcutaneously, $\frac{1}{2}$ c.c. on the second day, 1 c.c. on the third, and 2 c.c. on the fourth. The injections of 2 c.c. are continued every two or three days. If the result obtained is not definite or sufficient with the quantity of serum removed, a fresh supply of blood is taken to keep up the treatment.

Flaudin's experience of this treatment now spreads over several years, and he has met with no contra-indication to this method of desensitization by auto-serum treatment. The cure is usually only valid for the year, and the treatment must be renewed each year. In many cases, however, the attacks of hay-fever appear to be much less severe in the year following the initial treatment. It is impossible to say how many injections will be necessary in each case. In fortunate ones, the symptoms get much less after the first injection and definitely disappear after the third. Even in such cases, it is wise to give 6 or 8 in order to make sure of a lasting result. In obstinate cases, the benefit will only be apparent after 6 or 10 injections. In some very rare cases, relief is obtained at once, but only lasts a short time, so that the treatment must be repeated several times before a cure can be spoken of.

Small doses are injected to begin with in order to avoid any secondary reactions, local or general. Flaudin has very exceptionally noticed a local reaction after the first injection, and sometimes after the second, which recalls the appearance of the intra-dermal reaction to tuberculin.—(*Journ. de Méd. et de Chir. prat.*, June 25, 1921.)

Relations of the Septic Mouth to General Diseases.

Léon Trey and Charles Ruppe, as the result of their inquiries into this subject, have come to the conclusion that:—

1. Buccal septicæmia is a definite entity.
2. Just as pneumonia may be set up by increasing the virulence of the pneumococci present in the mouth, so a dental abscess occurring in a susceptible patient, may be the starting point of infectious symptoms, although it is not of frequent occurrence.
3. The same applies to chronic infectious symptoms arising from the mouth and teeth. These are the foci to attack. It is a matter of elementary hygiene, but the part they play in the genesis of diseases ought to be determined by long and careful research work.
4. Zones of bony rarefaction shown by X-rays do not always indicate abscess, but form an additional symptom of value, showing the condition of the peridental layer.
5. The extraction of all carious teeth is not good practice. The mouth and teeth should be put into, and kept in, conditions of usefulness and health.—(*Journ. de Méd. et de Chir. prat.*, May 25, 1921.)

Reviews of Books.

Clinical Disorders of the Heart Beat. By SIR THOMAS LEWIS, M.D., F.R.S., etc. Fifth edition. Pp. 120. Figs. 54. London: Shaw and Sons.

THAT a fifth edition should be called for at so short an interval from its predecessor is evidence of the value of the book.

The author is plainly desirous of presenting the results of recent research in cardiac pathology and its bearings on the heart-beat in a manner capable of application in clinical practice without recourse to the elaborate instruments by means of which his own investigations have been made.

The scope of the work is indicated by the contents, which include sinus irregularities, heart block, premature contractions, simple paroxysmal tachycardia, auricular flutter and fibrillation, and alternations of the heart.

There are 54 figures which graphically illustrate the text. The index is singularly complete.

We have studied the volume with interest and profit, and we have nothing but praise for the lucid manner in which so difficult a subject is presented.

Manson's Tropical Diseases. Edited by P. H. MANSON-BAHR D.S.O., M.D. Seventh edition. Pp. xvi + 960. London: Cassell & Co. 30s. net.

WE know of no work on tropical diseases better suited to the needs of the student and of the practitioner in the tropics than this, and under the able editorship of Dr. Manson-Bahr the volume provides a comprehensive study of this branch of medicine. Malaria is elaborately dealt with and includes an account of all the methods of prevention and prophylaxis. Recent work on trypanosomiasis, Leishmaniasis, schistomoniasis, etc., is included, as well as Noguchi's work on yellow-fever. Rogers's and Muir's work on the treatment of leprosy with chaulmoogra oil and sodium gynocardate and morrhuate are described. An account is given of the "vomiting sickness of Jamaica," now shown by the work of Scott to be due to poisoning with toxic substances which are present in the unsound or unripe ackee fruit, though not in the sound and mature fruit. Dysentery is classified as protozoal, bacterial, and verminous; the last-named term we do not like, for it has come to be associated particularly with ecto-parasites of the skin. Why not "helminthic"? The last 50 pages of the book give an account of clinical laboratory methods; on the whole, we doubt the wisdom of the inclusion of this matter. On the other hand, the accounts of mosquitoes, biting flies, and other "insects" and of parasites will be of the greatest value. A feature

REVIEWS OF BOOKS

of the book is the wealth of illustrations, and the coloured plates have been beautifully reproduced.

Physiology and Pathology of the Cerebro-spinal Fluid. By WILLIAM BOYD. London: The Macmillan Co. Pp. 176. 30s. net.

A FULL and interesting account of the properties and variations of the cerebro-spinal fluid in health and disease will be found in this book. The contents are divided into two parts. The first part deals with the general properties of the fluid and includes descriptions of the Wassermann and colloidal gold reactions, while in the second part the changes in connection with special diseases are discussed.

Lumbar puncture is well described, together with an interesting note on the ill-effects that sometimes follow this procedure, and the chapter on therapeutics gives an adequate idea of the class of case in which some benefit from this operation may be looked for. The book is pleasantly written, and the illustrations, which include six coloured plates, are very good.

The Shibboleths of Tuberculosis. By MARCUS PATERSON, M.D. Pp. 239. London: John Murray. 10s. 6d. net.

THIS is a most arresting book, and deserves the careful attention not only of the general practitioner but more especially of the tuberculosis specialist. Dr. Marcus Paterson's *The Shibboleths of Tuberculosis* is epoch-making, setting out in the full sunshine of professional opinion 59 catch-phrases or cries, to which the medical profession, including the specialists who ought to know better, still adheres. Let us hope that the sunshine disinfecting power of professional opinion will exterminate these (and other) catch-phrases or cries and render them powerless for future harm. Progress will then be made in tuberculosis prevention and treatment.

It is impossible, in a short review, to tabulate satisfactorily all the thought-treasures to be found in the book, but, with a view to making readers desirous, and eager, to know more by reading the book for themselves, it will suffice to set out as samples of such treasures a few of the more brilliant ones, with apologies to the author for daring to make a selection from what is a unique collection of priceless specimens.

According to the author, tuberculosis is *not* an hereditary disease, and the clubbing of fingers means nothing as a diagnostic sign. Physical signs and the stethoscope must be relegated to their proper positions and not unduly emphasized. A tubercle-bacilli-positive examination of sputum is *not* in itself evidence of activity of the disease, nor is a tubercle-bacilli-negative examination evidence of no tuberculosis. It is misleading to divide the disease into the three distinct forms, acute, sub-acute, and chronic, and it does not follow that once a patient is tuberculous, such patient will always be tuberculous. A subcutaneous tuberculin

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reaction is *not* necessarily evidence of active tuberculosis nor is a positive von Pirquet test. On the other hand, the opsonic index may be of great value, as also may a blood inoculation. It is not possible, clinically, to distinguish between influenza and pulmonary tuberculosis. Active tuberculosis can *not* necessarily be detected by the X-rays. Hæmoptysis is *not* always a sign of active tuberculosis, nor is it advisable to suggest that hæmoptysis in young persons often proceeds from varicose veins in the throat! Further, hæmoptysis is *not* necessarily caused by exertion, nor are cold drinks and foods (much restricted in amounts) and the sucking of ice to be advocated as routine treatment. Pleurisy in young persons is an alarming diagnostic sign of the disease, a pleural effusion is *not* diagnosable by physical signs alone, *all* acute, serous, tuberculous, pleural effusions should *not* be aspirated, it is *not* good practice to open a tuberculous empyæma nor to scrape a tuberculous larynx, etc., etc.

Finally, as the greatest shock to the readers, Dr. Paterson throws doubt upon "open air" as curative treatment, night air as prejudicial, great altitudes and pine trees as "cure-alls," and sanatoria as *useless* institutions. Tuberculosis is a blood disease or infection, to be cured by auto-inoculations.

Gout. By LLEWELLYN JONES LLEWELLYN, M.B., with a Section on *Ocular Disease in the Gouty*, by W. M. BEAUMONT. Pp. 455. London: William Heinemann. 30s. net.

THIS book is well arranged, even the old and present theories of this most indefinite complaint are so treated as to cause no weariness in reading; the rise and fall of some, including the uric acid theory, being well gone into, but not at too great a length.

There are instructive chapters on "Gout as an Infection," and the action of infective processes on the subjects of inherited instability of nuclein metabolism. Although it is not known what is the specific nature of the infection which either causes an alteration of cellular metabolism resulting in gout—or excites it in a predisposed individual—still the remarkable results of the elimination of infective foci, *e.g.*, oral sepsis, in gouty patients tend to turn our particular attention to this as a probable cause of gout; and the evidence is carefully gone into in this book.

As regards diagnosis the presence or absence of tophi is insisted on. On the other hand the difficulty of relying on X-ray examination of the joints is pointed out, unless as a help towards diagnosis.

The dietetic treatment is discussed in a singularly rational and open-minded way, and extremist views of elimination of one or other group of foodstuffs, for instance, those containing purins, are not favoured. The final chapter on climato-therapy and hydro-therapy is undoubtedly written by a man of real practical experience.

This book is one which presents to the practitioner a sound exposition of the present day position of gout, both as regards theory and treatment.

Preparations, Inventions, Etc.

ANTUITRIN.

(London : Messrs. Parke, Davis & Co., Beak Street, W. 1.)

This is a solution of the active principles of the anterior lobe of the pituitary body, specially prepared for hypodermic administration, which has the advantage over giving the dry substance by mouth, in that possible impairment by the digestive juices is avoided.

There is nothing very definite known about the conditions in which this particular hormone is of benefit, but it is reported to be of therapeutic value in certain disturbances of metabolism, in delayed development, both mental and physical, and in derangements of the genito-urinary system. The diseases concerned in such reports have been suppressed menstruation, menorrhagia, without apparent cause, osteomalacia, exophthalmic goitre, impotence, premature senile decay, and bronchial asthma.

It is issued in boxes of six ampoules containing 1 c.c. in each.

BENZYL BENZOATE CAPSULES.

(London : Messrs. Parke, Davis & Co., Beak Street, W. 1.)

This compound is found in Balsam of Peru and Balsam of Tolu, but can be prepared synthetically. It has been found to possess considerable effect in the relief of spasmodic conditions or rigidity of unstriated muscle. Good results have been obtained from its use in diarrhoea, dysentery, intestinal colic, cardiospasm, gall-stone and renal colic, spasmodic dysmenorrhoea, angina, and true asthma.

It is issued in boxes of 12 or 100 capsules, which are elastic and soluble, and each contains 5 minims of the fluid diluted with 5 minims of oil. The dose is 1 to 3 capsules, three or four times a day.

BACTERIOLOGICAL PEPTONE.

(London : Messrs. Parke, Davis & Co., Beak Street, W. 1.)

This product is specially prepared for use in the various culture media in which it is one of the necessary ingredients.

It is equally suitable for use by injection, hypodermic and intravenous, in the "foreign protein" treatment of migraine, asthma, hæmophilia, purpura, certain infections, urticaria, arthritis, epilepsy,

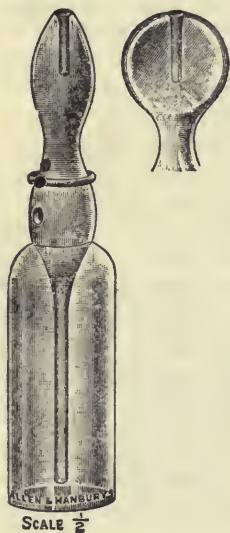
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and before and after injections of Salvarsan in the treatment of syphilis. It is issued in bottles of 1 oz. and 1 lb.

DIPHTHERIA TOXIN FOR THE SCHICK TEST, DIPHTHERIA PROPHYLACTIC TOXIN-ANTITOXIN.

(London : Messrs. Burroughs Wellcome & Co.,
Snow Hill Buildings, E.C. 1.)

The diluted diphtheria toxin for the Schick test is being issued in 1 c.c. phials ready for immediate use, together with phials containing the same quantity of the diluted toxin which has been heated, the latter being for a control test. These solutions retain their strength for a fortnight if kept in a cool cupboard, or, preferably, in an ice-chest. The toxin-antitoxin mixture gives immunity, apparently complete and permanent, after three weekly hypodermic injections of 1 c.c. of the fluid. It is issued in phials containing 1 c.c. for use. Dr. Park, of the New York Department of Health, has reported in nearly 5,000 observations, and reports that the immunity has persisted in more than 90 per cent. of the first hundred treated. The most favourable age-period for the administration is from 6 months to 5 years.



ALL-GLASS INHALER.

(London : Messrs. Allen and Hanburys, Ltd.,
48, Wigmore Street, W. 1.)

Dr. Macdonald, of Inverness, has designed this new inhaler, which gives a highly saturated vapour with volatile drugs in the treatment of all kinds of respiratory, laryngeal, pharyngeal, and nasal affections. It can be safely sealed for carrying about with the fluid in it, and so is ready for use at any time. It is fitted for nasal and for oral inhalation. Being all glass, it can be sterilized by boiling.

HARROGATE.

We have received a copy of the illustrated booklet issued by the Harrogate Corporation Publicity Department, in which are included full and complete details about what is called "the Mecca of the ailing and the playground of the robust." It is a further proof of the fact that the great spas and watering-places in this country have realized the necessity for informing the public that every variety of Spa treatment is obtainable without crossing the Channel, and under the very best conditions in every respect.

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SEPTEMBER

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Nævi in Children and their Treatment.*

BY DUNCAN C. L. FITZWILLIAMS, C.M.G., F.R.C.S.

*Surgeon-in-Charge, Out-Patients, St. Mary's Hospital, Paddington,
and Surgeon to the Paddington Green Children's Hospital.*

THIS subject may at first appear a very small one, but when it is considered that permanent disfigurement may result from want of skill, or want of knowledge of the factors at work, it will be understood that its importance must be unquestioned. Parents, at all events, lay great stress upon their children being rid of the condition with as little delay and scarring as possible. For many years careful notes were kept of all my cases and more than 700 cases were collected, in addition to which over 300 other cases must have been seen of which there are, unfortunately, no notes. This number is enough to draw conclusions from, and their study is sufficiently interesting.

A nævus is a blood-vessel tumour growing by the formation of new vessels. One is rather apt to lose sight of this, and merely to regard it as just a mark which may or may not be spreading. It is just as

* Read before the Harveian Society. Specially revised for
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much a tumour as a chondroma, more common and much more important.

The varieties and histology are best taken together; for at the present moment the classification of nævi is based upon some supposed study of histology, and they are classed as simple, arterial, and venous. But as, unfortunately, they are composed of spaces of various sizes, they can be neither arterial nor venous, and the term simple conveys nothing to anyone. The terms capillary and cavernous are also applied very loosely, but happen to be accurate.

Probably all nævi start in the same way, as an increased growth of the ordinary capillaries, new ones forming in much the same way as capillaries form in granulation tissue. The cause of the peculiar growth is no more known in this form of tumour than it is in any other. The capillaries are crowded together with very little interstitial tissue between them. This can quite well be seen in the superficial nævi. When situated in the deeper tissues, another change often takes place, for the fine septa between the capillaries break down and disappear, the capillaries run together and so form cavernous spaces. The older a nævus is, the more likely is this to happen. This change is never seen in the cutaneous or superficial nævi, probably a prevision of nature to prevent severe bleeding if ulceration should occur. It is not generally understood that a nævus always spreads by the formation of capillaries; cavernous tissue does not spread, but is formed later from the capillaries in the way just mentioned. This can quite plainly be seen in subcutaneous nævi which are approaching the surface, for they often appear through the skin at several points, but always as capillaries, which later fuse together into one large red area. As long as a nævus is spreading, it is surrounded by a band of spreading, actively-growing capillaries. This ex-

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plains the fact, so often noticed after excision, that if a portion of the edge is left behind, the nævus will infallibly recur. This is often illustrated in superficial nævi which have ulcerated, as they so often do; the middle portion is cured, but the scar is surrounded by a red sinous line like a ringworm, which gradually spreads, showing that the edge is still active. Another curious point is that the scar tissue thus formed in the skin after ulceration is never infected again by the nævus, though cavernous tissue may form below. Probably the destruction of the capillaries by ulceration in that area prevents the nævus again invading the skin.

The only classification I can find worth following is, like the classification of lipoma, one of position. Those in the skin and mucous membranes are cutaneous, mucous, or superficial; those in the deeper structures are subcutaneous, and those that are in both are transitional.

Of these varieties, out of 853 nævi noted, 58 per cent. were superficial, 35 per cent. transitional, and only 8·5 per cent. subcutaneous. These figures do not include the small spider marks, nor the condition of dilated vessels in the skin which we call nævoid, but which are quite separate from the true nævus or blood-vessel tumour; that is to say, that the nævus starting in the skin is by far the commonest form. If, however, time is given, a large number of superficial nævi spread to the deeper tissues, and many transitional nævi may have been superficial at some time. When nævi do spread in the deeper tissues, they invade any soft tissue in the region, but I have no knowledge of their invading bone. On the other hand, it is not nearly so common for subcutaneous nævi to invade the skin; they prefer to spread in the subcutaneous tissues. The characteristic invasion of the skin can, however, be seen fairly often. The

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number of subcutaneous nævi must, of necessity, remain uncertain, for we find them in the viscera, liver, bladder, intestines, and other organs where they remain undiagnosed throughout life.

Ætiology.—It is, perhaps, a curious fact that nævi are only seen in fat, healthy infants, as if they were an expression of superabundant energy on the part of the child. In 700 cases, the sex was found to be: females 65 per cent., and males only 34 per cent.; that is, two girls were affected to one boy, figures which are not shown in any other form of tumour. It might be argued that the condition is more important to girls than to boys, and that therefore the girls are more frequently brought for treatment. That view cannot, however, be accepted. If it were so, one would find that the boys were brought only if the nævus was on an exposed part. Such, however, is not the case. The great bulk of children are brought for treatment before the sixth month, and it can hardly be urged that sex at that age plays an important part in the attitude of the mother to the infant. The figures given, therefore, probably represent the facts with fair accuracy.

Age.—It used to be taught that nævi were either present at birth or appeared in the first year of life. My experience is that they are nearly all present at birth. One was often informed by the mother that they had appeared upon such and such a day; but that day was always in the first fortnight, and after a time one recognized that that was the first day that the mother had been allowed to bath and tend the child. Till that date, the nurse had either not noticed it or had kept silent about it. In 645 cases, the nævus was present at birth in 83 per cent., appeared in the first six months 13 per cent., and at a later date only 4 per cent. Some of those noted after birth were subcutaneous at first, and became

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visible through the skin later.

Sites.—It is a curious fact that nævi occur on the head and neck as often as they do upon all the



FIG. 1.—*Diagrammatic representation of the position and shape of Nævi.*

rest of the body. My figures show head and neck 49 per cent. (of which the neck is only 3 per cent.), the trunk 29 per cent., and the limbs 21 per cent.

Nerve Influence.—In studying nævi, one was very soon struck by the fact that they did not grow equally in all directions; that is to say, they were not round. They may have been round once when small, but they soon became elongated, and often quite long, narrow marks. The long axis of the nævus will always be found to lie in the same direction as the nerve which supplies the part. Numerous photographs could be shown illustrating this point. It is, perhaps, best seen on the abdomen or chest. In some cases, the nævi may have a very similar distribution to herpes zoster. Another tendency is that they like to appear near the place where nerves become cutaneous. This is well seen near the middle line or down

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the side of the body. Areas belonging to special nerves may be picked out on the limbs, while, on the

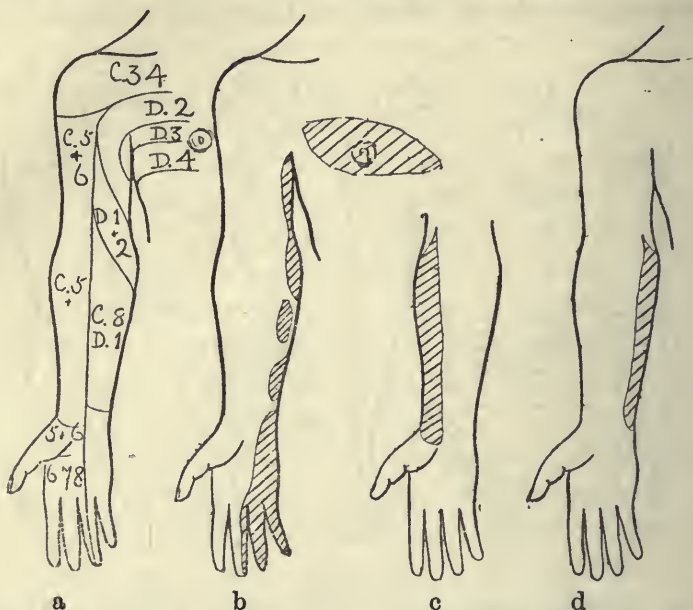


FIG. 2.—a, approximate areas supplied by different nerves. b, c, d, actual cases seen.

face, areas corresponding to the three divisions of the fifth nerve may be affected; sometimes on the limbs segmental nerve areas are seen involved. The

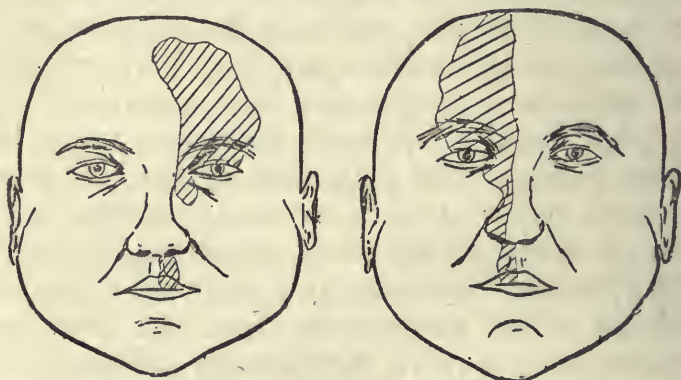


FIG. 3.—Nævus involving chiefly the 1st division of the 5th Nerve. only positions where nævi show a tendency to grow across the limbs are in the flexures of joints, behind

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the knee, and in front of the elbow.

Course.—What happens to nævi if they are left to themselves? There is no doubt in my mind that



FIG. 4.—Showing large area of the Cervical Nerves affected.

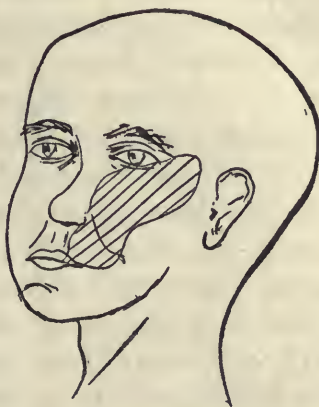


FIG. 4A.—Large area of the 2nd division of the 5th Nerve.

some, at all events, disappear of themselves, for we do not see on old people the same number of nævi that we see in children; though, when these people were young, excision and other forms of treatment were not so common as they are now.

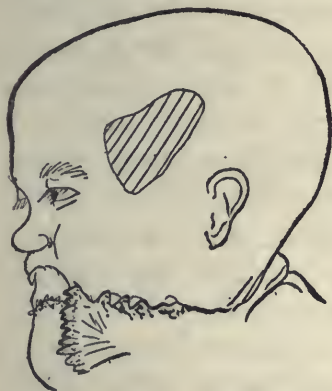


FIG. 5.—Nævus involving the area of the temporal branch of the 5th Nerve.

Some ulcerate and disappear; others ulcerate but do not quite disappear, for a spreading ring of red capillaries is left. In some, the superficial part

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ulcerates and disappears; but if there is a deeper portion, this does not disappear, but continues to grow, so that the scarred skin is raised up prominently by the growth in the underlying tissue.

In some the growth is enormous. This is best seen in those nævi invading the cheek, though it may be seen elsewhere, too. The growth may close the eye; the nose becomes sunken and lost in the mass, and horrible deformity may be brought about. It is said that death can be caused from hæmorrhage in these cases, but I have never come across a case personally.

In adults, it is quite common to see areas of blue nævoid tissue with altered skin over it, showing that at one time the nævus was in the skin, but that the skin has recovered from the condition. In some adults we see the true nævus left; as a rule, they look very much more blue than they did in early life, and have lost their bright redness.

Treatment.—The best way to deal with the treatment is to take the different varieties in turn.

The spider mark, or telangiectasis, looks like a vein with many smaller vessels converging on it. If, however, a piece of glass is pressed over it, the direction of the blood-flow will be seen to be from the so-called vein into the smaller vessels and never in the opposite direction, as it should be if the vessel was really a vein. This spider mark never grows to a large size, often appears in childhood, and may appear in later life. I have seen a true nævus start round the central vessel. The condition is not to be confounded with the dilated vessels which appear upon the faces of old people, especially those suffering from circulatory troubles. It can be dealt with very simply, for all that is necessary is to destroy the central vessel, and no more blood can flow. This can be done by injecting, even in nervous children, a few drops of novocaine solution under the skin, and the vessel

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is destroyed by a hot knitting needle or the electric cautery. A little ointment is then applied, and a complete cure will result.

The cutaneous nævus should be treated without delay as soon as ever it is seen, before it has had time to invade the subcutaneous tissues. If purely in the skin, it is merely capillary and may be destroyed by CO₂ snow. The snow is best made from a large cylinder of liquid carbon dioxide, which should be placed with the nozzle downwards. The tap is turned and the fluid allowed to flow out smartly into a towel or leather bag. The snow is collected in a suitable mould and beaten hard into shape. The harder it is the easier is it to handle, and the colder will be the freezing produced. The thick pencil which comes from the mould should be cut to the exact size and shape of the nævus. The nævus should be washed with a little ether or iodine, and the pencil pressed firmly down over it for a period of 30 to 40 seconds. On removing it a hard depressed area should be seen frozen in the tissues, a little larger than the pencil which produced it; that is to say, it should overlap the nævus everywhere. This will thaw out in a few moments, and the thawing can be hastened by the application of the warm hand. A local but intense frostbite is thus produced. It should be dressed with ointment, and covered in exactly the same way as a burn. Blebs and superficial ulceration are produced, which should not destroy the true skin, so that healing is rapid and there is no scarring.

If the nævus is too big to be treated in this way, the snow may have to be applied in two or three places, care being taken that the frozen areas do not overlap, but that unfrozen tissue is left between them. The process will have to be repeated in order to deal with the untreated areas. This, however, is

rare, for in large nævi the subcutaneous tissues are usually invaded, and the method is then useless; snow cannot act deeply enough without completely destroying the whole skin, and then scarring results.

Excision is equal in every respect to CO₂ snow, but it must be carried out carefully and with knowledge if scars are to be avoided. Kocher first showed that there are definite lines of cleavage in the skin, and that if incisions are made in these lines, the healing is much quicker and better than when the incision is made across them. The same thing is true for the permanency and visibility of scars. The question is sometimes put to one in the witness box, "Do scars disappear?" The answer is: Yes, completely. If anyone doubts this, let him examine his hands and see how many of his boyhood's cuts have left any scars; very few can show a single scar.

With a carefully placed incision, and healing by first intention, the scar in a young child's skin will have completely disappeared in less than three years. An elliptical incision made at right angles through the skin into the subcutaneous tissue, and the whole affected area removed. The knife should never touch nævoid tissue, and often no vessels then need clamping. If, however, it encroaches upon the nævus, the bleeding is exceedingly difficult to stay, for it comes from spaces and not from vessels. If a portion of the nævus is left behind, it will continue to grow and will recur. The wound can be sewn up by a subcutaneous suture.

Electricity is not so suitable for these cutaneous cases, and is much inferior to these other methods; it is too clumsy, too local, and leaves more scar than is necessary. Subcutaneous and transitional nævi may be considered together, for the consideration here is not to destroy the superficial growth in the skin, but to destroy the growing edge which surrounds

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the whole of the tumour.

Excision is the best method to adopt, wherever this is possible. The tumour is removed in one operation, an anæsthetic is only required once, and the method is the shortest and surest we have at our disposal. It is not, however, always possible to do this, either on account of the position or size of the tumour, and therefore we must consider other methods. Of these the next best is the use of the cautery.

The cautery can be used in several ways. Bearing

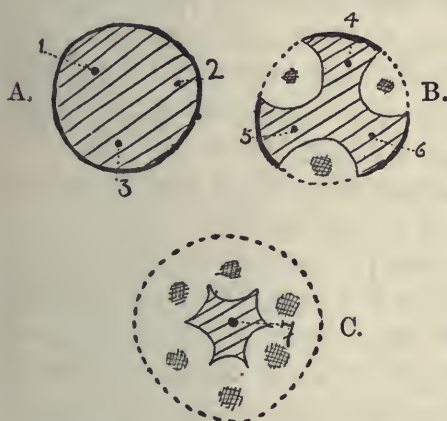


FIG. 5A. — *Method of treating Nævi by the Cautery, a period of three weeks is left between each treatment.*

A. 1, 2, and 3, the sites where the Cautery is applied.

B. The result three weeks later ; at 4, 5, 6 the Cautery is again applied.

C. The result three weeks later ; 7, the last remaining area dealt with by the Cautery.

in mind that it is the growing edge which must first be attacked, the cautery must be so applied as to destroy this, and the main portion of the tumour is dealt with later.

There is a difference in the cautery used. The Paquelin cautery with the fine round point is best for large tumours ; its temperature is more constant, for it is not so readily cooled as the electric cautery, but it is a little clumsier and leaves rather more scar. On the other hand, it will destroy more tissue and is much less trouble.

In dealing with a large nævus partly in the skin and partly in the subcutaneous tissue, in an area such as the back, buttock, or leg, where the scar will not be seen, the method of procedure is as follows.

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The child is anæsthetized and the skin prepared in the usual way. If chloroform is not used, the danger of ether catching fire must always be borne in mind. The cautery is heated to a dull red heat, and thrust in near the edge of the tumour. It is thrust in deeply, and made to destroy the tissue by moving it in a semi-circular manner under the skin. Only the end of the point is hot, so that if thrust deeply the skin itself is not extensively destroyed. The point is then withdrawn, and inserted again at such a distance from the first spot that the destroyed tissue will be quite distinct from that of the former insertion; the same manœuvre is carried out. A third insertion can often be made, but very seldom is the tumour large enough to allow of a fourth.

No bleeding should occur if the heat of the instrument is properly regulated, and this is much easier with the Paquelin than with the electric cautery. The dry holes left are then filled with boric acid powder, a piece of gauze fixed over with collodion, and a dressing and bandage applied as a protection. The result is that in a few days the holes, where the cautery was inserted, grow bigger as the injured skin dies. If kept aseptic and dry with boric acid powder, a scab forms in a week and the healing proceeds under the scab. When the scab falls off in a fortnight's time, the wounds are quite healed. The nævus can then be watched for a fortnight to three weeks to see how much is destroyed, not only by the cautery but by the after contraction of the tissues. The cautery can then be applied again in a similar manner to the areas that still need it. Two, or at most three, applications will suffice to destroy the whole nævus. It is quite unnecessary to touch the red area in the skin itself, the subsequent contraction will cause this to disappear without further trouble. The cure can in this way be brought about, and all

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that is left are perhaps six small pock marks where the cautery was inserted ; these, in the course of time, become imperceptible.

If the nævus is on the face, and one wishes to reduce scarring to a minimum, the cautery is inserted into the centre of the nævus, and made to destroy one half by semicircular movements to one side, the skin being pinched up in the fingers, so as to come far up the cautery to a point where the heat is not so extreme. When this application is recovered from, the other side can be dealt with through the old scar. In this way only one pock mark is left. This method is, however, not quite so reliable, for one is never quite sure that all the growing edge is destroyed.

Another excellent way of applying the cautery, especially on the face where scarring is to be avoided, is to plan an incision through unaffected skin, to one side of the tumour. The incision should go deep enough to reach the under surface of the tumour. The edges of the incision are then carefully guarded, the tumour side of the incision picked up and the nævus pressed into the wound so as to expose its under surface. The cautery is then applied to the under side of the nævus, special attention being paid to the growing edge. When sufficient has been done, the incision is closed by a subcutaneous suture.

Destruction of the nævus by electrolysis is a slow method and to some extent unreliable, for one is never certain how much has been done at each sitting. Repeated anæsthetics are required over a long period during which time the nævus is still growing.

The method can be carried out with one needle inserted into the growth, and the other terminal being applied to another part of the body ; this is, however, ineffectual, for only a weak current can be used. Both poles should be inserted into the nævus. There is not much to be said in favour of using poles

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with many needles, they are always clumsy, and cannot be manipulated with the same ease as single needle poles. The positive pole is very inactive and adheres at once to the tissues by oxidation, so that it cannot be moved about. It only destroys the tissue in its immediate neighbourhood. The negative pole gives off nascent hydrogen, which is very active in the destruction of tissue; the needle is always surrounded by bubbles, is therefore loose, and can be moved about in the growth, so that its destructive action can be applied where it is needed. A galvanic current is used, which causes a twitch when it is turned on; it should therefore be weak at first, but afterwards can be increased in strength till the tissues are crepitant with the hydrogen from the negative pole. Both poles being in the nævus, the current will pass directly from one to the other, and the strength of the current can be of no danger to the child. The current should be weakened again before the needles are removed. Often bubbles of gas can be seen passing along the superficial vessels and getting lost in the circulation. To increase the action of the nascent hydrogen, pressure should be made round the nævus by means of a rubber ring which prevents the escape and localizes the action of the gas. My own idea is that the nascent hydrogen so injures the endothelial lining of the spaces that clotting occurs. It is therefore important to localize its action to the nævus.

Gas will also escape on to the skin along the needle and cause destruction of the skin and scarring. To avoid this, the needles are isolated with a thin coating of rubber material. It is, however, difficult to insert the needle far into the tumour with this coating, and after a time the coating peels off. This can be avoided to a certain extent by inserting the point of a tenotome into the skin and passing

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the needle in through the hole thus made. The needle of the negative pole is always bright, while that of the positive pole is oxidized black. The latter will leave a dark tattoo mark if it is near the surface, from the oxidation of the metal, so that it is best to place it rather deeply. On removing the needles no bleeding takes place at the positive pole which, as has been stated, is tightly attached to the tissues, while smart bleeding may occur at the negative pole. It is a good plan, therefore, to weaken and then to reverse the current for a minute before withdrawing the needles. This loosens the original positive pole, and stops the hæmorrhage from the negative.

The application must vary in time with each case, depending very much on the size of the nævus and the strength of the current used. After a short time the nævus will be felt to go hard, and this is more quickly brought about if the rubber ring here advocated is used. It should be made to go hard all over, especially the growing edge. This hardness means that thrombosis has taken place in the spaces; organization and, one hopes, cicatrization will follow. About a month is given to see the result, and any parts which remain active are then dealt with.

This description sounds very easy, but in practice it is by no means easy to destroy a nævus of any size simply by electricity. I have seen nævi under this form of treatment month after month without any diminution in size; indeed, a rapidly growing nævus may be even larger at the end of the time.

Besides the nævi proper, there are other closely allied conditions, the nævoid marks and port-wine stains, which are so disfiguring when seen upon the face. One always wonders why these unfortunates do not have something done.

By port-wine stains, I mean congenital dilatation of the capillaries of the skin. It is not a tumour, it

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never grows nor changes, often has the distribution of a particular nerve, it is bright in early life but gradually becomes bluer as age advances. The colour is homogeneous, and the individual capillaries cannot be seen separately.

By nævoid marks, I mean a condition of small dilated vessels distributed congenitally over an area, very similar to those vessels seen on the face and nose of an old man much exposed to the weather, and perhaps assisted by a certain amount of alcohol. These marks do not grow, and have much the same characteristics as the port-wine stains, except that the individual vessels are easily seen.

The treatment of these two conditions is very similar. For the port-wine mark CO_2 snow may be tried, but is often ineffective. Electrolysis is carried out with the negative pole only under the skin, the positive pole being a flat disc, soaked in brine in the usual way, applied quite near. The current should be a weak one.

The needle should be long, inserted just at the depth of the vessels, and thrust right across the mark. It need only be left in a few seconds so as to destroy the vessels locally. It is then withdrawn and thrust in parallel to its last position, but about a half to one third of an inch to one side. The process is repeated and in this way a large area of the mark can be dealt with. At the next sitting the needle is passed in between the old sites, so that the same area is gone over twice. A third and a fourth time may be needed. The area will become very much paler, and in some cases it becomes scarcely noticeable, except upon a cold day. Another way to treat the port-wine stain is to insert a long tenotome, or very thin knife, and carefully undercut the skin, separating it from the subcutaneous tissue. Cicatrization will follow with fading of the mark.

Examination of the Blood in Diabetes Mellitus.

By R. T. WILLIAMSON, M.D., F.R.C.P.

Consulting Physician to the Royal Infirmary, Manchester.

DURING the last ten years much attention has been paid to the clinical examination of the blood in diabetes mellitus, and the value of estimations of the percentage of blood-sugar has been demonstrated. In most of the methods of such estimations (as in Bang's method, one frequently used), the quantity of blood employed is usually very small; and hence the very definite amounts of sugar recorded are somewhat astonishing. Unless the medical man has been trained as an analytical chemist before taking up medical work, or unless he has had some special training in physiological chemistry or analytical work, these analyses of blood may be found difficult to carry out at first.

In this note, I should like to draw attention to a method of blood examination which can be readily carried out by any intelligent medical practitioner (if he will pay strict attention to the details), even if he should have had no previous experience in analytical work. The test can be carried out in any consulting room, or even at the patient's bedside.

I first published this method of blood-examination in 1896, and showed later that, in diabetes, the reaction was due to the excess of sugar in the blood of the patient. At that time clinical examination of the blood in diabetes was seldom made, and little importance attached to it; but, as it is now regarded of

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practical value, this method of blood-examination may be found useful as an indication of *definite* changes in the amount of blood-sugar, though it will not be sufficiently delicate to indicate *slight* changes. It is not a method for estimating the exact percentage of sugar in the blood, but it is a means of demonstrating that the blood-sugar is definitely increased. In cases of glycosuria or diabetes, when the percentage of blood-sugar is normal, or but little increased, no reaction is obtained. When the blood-sugar is much increased, a definite reaction will be obtained, and this will be more evident the higher the percentage of sugar. When the percentage of sugar is only very slightly above the normal, the reaction will be slight or indefinite, or no reaction will be obtained.

Only a very small quantity of blood is required—a large drop. The details of the test are as follows:—

For carrying out the test a small test tube is employed, the diameter of which should not be more than quarter of an inch. If the diameter of the test tube is greater, the test may fail. The small test tube is washed out with water. The water is then jerked out of the tube, with the exception of one drop, which is allowed to remain at the bottom of the tube (filling the lowest quarter of an inch of the tube). The patient's finger is then pricked, and 20 cubic *millimetres* of blood are taken up with a fine capillary tube, placed in the tube, and mixed with the drop of water (the capillary tube of a Gowers's hæmoglobinometer, which is graduated for 20 c.mm., is a suitable tube to use).^{*} If the blood should adhere to the side of the small test tube, it must be carefully shaken to the bottom. Then one cubic *centimetre* of a 1 in 6000 watery solution of methylene blue is added. (To measure this the 1 c.cm. tube of a Southall's ureometer may be used.) Finally 40 cubic *millimetres* of liquor potassæ (B.P.) are added to the mixture. Then the contents of the small test tube are well mixed by placing the finger tip at the open end of the tube and *slowly* inverting the tube six or eight times. It is important to see that the blood does not remain at the bottom of the tube, but is mixed thoroughly with the other fluid. The mixture has a deep definite blue or bluish green colour. The tube is then placed in a water-bath, and the water kept boiling for four minutes. A beaker may be used for the water-bath, or, more conveniently, a very wide test tube 1 inch in diameter, containing

^{*} A 20 cubic *millimetre* tube may be obtained from Messrs. Hawksley and Sons, 83, Wigmore Street, London, W.1.

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water at the bottom of the tube. The water may be kept boiling by an ordinary spirit lamp. At the end of four minutes, if the blood-sugar is decidedly increased, the fluid in the small test tube will have lost its blue colour and become of a brownish yellow colour (almost the colour of normal urine). When the blood-sugar is not increased the fluid in the small test tube retains its blue or bluish green colour after heating in the water-bath for four minutes. (As a control experiment a second small test tube of similar size may be used, and into this is placed the same quantity of normal blood, with the same proportion of water, methylene blue solution, and liquor potassæ. This tube is placed in the water-bath by the side of that containing the diabetes blood. The fluid in the small test tube containing the normal blood never loses its blue colour; after heating in the water-bath for four minutes it may become bluish green or slightly changed in tint, but is never decolourized. This second control tube is not necessary, though at first it is useful.)

The small test tubes should be kept quite still whilst in the water-bath, since by shaking the decolourized methylene blue solution is readily oxidized by the oxygen of the atmosphere, and a blue tint may then return to the fluid which had been decolourized.

I have used this blood test for 25 years, and have never obtained the reaction in any disease except diabetes, when the proportions of fluid just given have been used. In 1896 I examined the blood in one hundred cases of the most varied diseases, and have examined, since that date, the blood of numerous diabetic and non-diabetic individuals, but always with negative diabetic and non-diabetic results except in diabetes mellitus.

Briefly stated, it is a test for indicating if the blood-sugar is markedly increased. (When the blood-sugar is only very slightly increased, the methylene blue solution may be altered in colour, but the blue or greenish tint is not entirely removed.)

For some time, I have tried the test in most cases of diabetes when first seen, and I find it of value as an indication of the severity of the diabetes. When a definite reaction with the methylene blue test is obtained, the case is more severe and the prognosis more unfavourable. If no methylene blue reaction is obtained, the case is of a very mild form and the prognosis better. In cases in which no methylene

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blue reaction is obtained at first, often a decided reaction is obtained later; and the development of this reaction is then an unfavourable sign.

On the other hand, when by treatment the urine becomes free from sugar, often the methylene blue reaction can no longer be obtained in the blood, and this is a favourable sign.

In cases of so-called "renal diabetes" no methylene blue reaction will be obtained.

In a severe form of diabetes, in which I found that the blood gave a pronounced methylene blue reaction (decolourized the alkaline methylene blue solution), phthisis developed. When the lung symptoms had become very advanced, the amount of sugar in the urine gradually diminished greatly, as is often the case, until finally the urine ceased to give any reaction with Fehling's solution on boiling, and oxide of copper was only thrown down slightly when the fluid cooled. Nevertheless, the alkaline methylene blue solution was still decolourized by 20 c.mm. of the patient's blood, when the test was carried out in the manner just described—showing that the blood-sugar was still markedly increased.

The methylene blue reaction is sometimes of service in confirming the diagnosis of diabetes. If we obtain a definite reaction with Fehling's solution in the urine, and still other indications of diabetes are wanting, confirmatory test for sugar should always be tried before concluding the reducing substance is grape sugar; the methylene blue reaction in the blood is a confirmatory test for diabetes, which may be of service before other tests are tried.

Occasionally the amount of sugar in the urine is small and the diabetic symptoms are slight, but the methylene blue blood reaction is definite. This latter would be a very unfavourable sign.

Occasionally cases of persistent glycosuria of long

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standing are met with, and yet the general condition remains remarkably satisfactory. Now, in some of these cases the methylene blue blood reaction is not obtained, indicating that the blood-sugar is not increased or only slightly increased, and this accounts for the satisfactory general condition.

Thus, in the case of a female, aged 22, the glycosuria was well marked and of four years' duration; yet the general condition was excellent, and the symptoms were very few. The methylene blue reaction was not obtained in the blood, indicating that the blood-sugar was normal or not much increased, and this probably accounted for the satisfactory general condition in a patient so young at the end of four years.

In another patient, aged 16, in spite of the large amount of sugar in the urine, the patient was quite healthy in other respects at the end of three years. Confirmatory tests showed that the reducing substance in the urine was grape sugar. The blood gave no methylene blue reaction, and this probably accounted for the satisfactory general condition. At a later date the methylene blue reaction was obtained, and the condition became worse.

Occasionally in cases of intermittent slight glycosuria the blood-sugar is markedly increased, and then the prognosis is more serious; in many cases of intermittent glycosuria, however, it is normal or only slightly increased. In many cases of intermittent glycosuria I have found no indication of excess of blood-sugar by the methylene blue test. In others only a slight reaction has occurred. In a few cases, however, a decided methylene blue reaction has been obtained, though the glycosuria has been intermittent and slight and other symptoms absent. This indicates a more serious prognosis.

Other blood tests are necessary and desirable, for indicating the exact percentage of sugar; but the methylene blue test I have here described will, I think, be found of considerable practical value as a preliminary blood test by those who wish to know something of the definite changes in the blood condition in diabetes, but have not the time nor the experience necessary for carrying out the more delicate and exact tests or estimations.

Gynæcological Causes of the Acute Abdomen.

By ALECK W. BOURNE, M.B., B.C., F.R.C.S.

Obstetric Surgeon to In-patients, Queen Charlotte's Hospital, and to Out-patients, St. Mary's Hospital; Surgeon to Out-patients, Samaritan Hospital.

THE pelvic organs in women are responsible for a number of conditions which cause the typical symptoms of the acute abdomen, at first sight indistinguishable from those originating in the abdominal organs proper, and giving rise to the same difficulty in diagnosis and anxiety about the correct line of treatment. Inasmuch, however, as the proper treatment for the two groups of cases is often different, it is important to recognize the gynæcological nature of the disease when the origin of the trouble lies in the pelvis.

Before describing the various lesions in detail, it will be well to refer to certain broad distinctions which can be made between the two kinds of emergency. Clinically, they often fall into two groups; one of which is characterized by an alimentary type of symptom, while the other frequently presents symptoms of a genital character, being associated with pregnancy, an abdominal tumour, or other prominent genital sign.

These distinctions do not and cannot apply entirely, for the abdomen and pelvis are, actually, one cavity, in which a suppurating pelvic lesion may give rise to a general peritonitis with its train of intestinal symptoms; but it still remains true that, at the outset, an acute pelvic lesion usually

partakes of a genital character, so far as its signs and symptoms are concerned.

There is, similarly, a broad distinction in the type of physical signs presented by the two conditions. A purely abdominal lesion with peritoneal irritation sets up a real rigidity, often localized over the site of the mischief; but in the case of acute pelvic conditions this is not always true, for the reason that many of them are, at least in the early stages, limited to the deep recess of the pelvic cavity and do not come into relation with the abdominal wall. There will be tenderness on deep pressure, with some muscular defence in practically every case; but there is often lacking that characteristic and unmistakable rigidity, which is commonly seen, for instance, in acute appendicitis.

But, if this important indication may be in abeyance, there are useful and often characteristic physical signs to be obtained by vaginal examination in nearly every example of acute abdominal illness due to pelvic disease, which leave one in little doubt about the true nature of the trouble. Further, it is true that these signs are, as a rule, clear and easy to appreciate, even to one comparatively unused to making pelvic examinations; unlike the meagre physical evidence that is often afforded by many chronic gynæcological disorders. The converse is, however, occasionally noted—as, for instance, in cases of accidents to pre-existing abdominal tumours. Here the signs by the abdomen are obvious; but frequently there is nothing abnormal to be discovered from vaginal examination owing to the tumour being too high up and out of reach of the examining finger.

Pregnancy as a complication may bear several relations to an acute abdomen, and its presence sometimes renders the diagnosis difficult and the treatment uncertain. In the early weeks the problem is usually

less difficult than in the later months, when the large bulk of the gravid uterus obscures the greater part of the abdomen from adequate palpation. Moreover, confusion may arise in late pregnancy between a lesion inside the uterus, such as a concealed hæmorrhage, and an extra-uterine condition such as general suppurative peritonitis. In both these cases there may be great abdominal pain, referred by the patient to the abdomen generally, without any subjective power of localizing the mischief; in addition, the constitutional state of the patient indicates a serious and urgent illness. During the early months the possibility of abortion, either as a result of the disease or of the treatment, adds to the general feeling of uncertainty.

We may regard pregnancy as a direct cause of an acute abdomen in tubal gestation, for example, or the unusual cases of spontaneous rupture of the uterus during pregnancy at the site of a Cæsarean section scar; while it is indirectly responsible in certain cases of torsion of ovarian cyst or fibroids; tumours, which, by the movement imparted to them by the rapidly-growing uterus, have undergone twisting of their pedicles.

The third relation of pregnancy is that of a purely accidental complication of a non-gynæcological disease, such as acute appendicitis or cholecystitis. The former is the most common of these associated lesions, and runs much the same course as in the non-pregnant.

When we come to consider the general lines of treatment, we find that the comparative immunity of the gut from accident, and the tendency of the inflammatory processes to be limited to the pelvic basin, render acute gynæcological conditions, as a rule, less urgent than those of the non-pelvic organs, with the important exceptions of ruptured pyosalpinx

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and ovarian abscess, some cases of ruptured tubal gestation, and accidents to the gravid uterus. On account of the rapid spread of peritonitis in the one and the dangerous internal hæmorrhage in the other, these cases are every bit as urgent in their demand for laparotomy as any other acute lesion of the abdomen.

In the case of acute tubal inflammation (excepting acute puerperal salpingo-peritonitis), which forms so large a proportion of the cases under consideration, we may go even further and say that not only is immediate operation not demanded, but that the best results follow from a judicious delay. If the diagnosis of salpingitis is clear, there is little difficulty in determining when to operate, but indecision will arise in those cases in which there is a possibility of the presence of a tubal gestation. The latter condition will be manifest in those cases in which the amount of blood lost has been of a dangerous degree, and which therefore require immediate operation. The blanched appearance, together with the other signs of internal hæmorrhage, give the case away unmistakably. But in the less definite cases, in which the amount of hæmorrhage has been insufficient to produce these signs, there is a notorious difficulty in deciding whether the tubal swelling is due to hæmorrhage or inflammation. In the former, the sooner a laparotomy is carried out the better; in the latter, a careful delay will usually benefit the patient.

Turning next to classification, the various conditions tend to fall into three main groups: (1) those due to infection; (2) those caused by internal hæmorrhage; and (3) accidents to pre-existing tumours.

The first group includes acute salpingitis, ruptured pyosalpinx or ovarian abscess, and acute peritonitis following perforation of the uterus in

criminal abortion. The third condition stands by itself as a separate clinical entity. Comparing the first two, we find, fortunately, as great a difference in physical signs as in the treatment required. In the case of acute salpingitis there is in the early stages, no pelvic swelling or lump to be felt. The tubes are as yet soft and congested, discharging pus into the pelvic cavity, but not palpable as discrete fixed hard masses, whereas in the peritonitis following a ruptured pyosalpinx there is a characteristic mass to be felt behind the uterus. Moreover, in acute salpingitis the disease is nearly always localized to the pelvis with only a moderate degree of general disturbance, but in the latter condition a general suppurative peritonitis is being established and the patient is in a very critical state. Acute puerperal salpingitis forms an exception to the foregoing remarks inasmuch as the tubes are, at this period of uterine involution, abdominal and not pelvic organs, giving rise to an abdominal and not a pelvic peritonitis.

It is clear, therefore, that a ruptured pelvic abscess must be operated on immediately. The urgency is nearly as great as in perforative appendicitis, but a non-puerperal salpingitis may be treated expectantly so long as there is no peritonitis extending above the brim of the pelvis. This is manifest, when it occurs, from the spreading rigidity, abdominal distension, and increase in the temperature and pulse-rate. Whether or not it may prove best to open all these cases of suppurative salpingitis with the object of performing salpingostomy in order to prevent the possibility of a subsequent pyosalpinx and to aid in the complete resolution of the tube, time and further experience will show. My own view is, that recently suppurating tubes should be treated not by resection or expectantly, but by slitting them open as far as the isthmus (salpingostomy). In this way, their function can be

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restored, and chronic disease certainly prevented.

A further acute clinical type of salpingitis is that furnished by an exacerbation of a chronic tubal inflammation, due to fatigue, chill, or other exciting cause. In these cases, there are the general symptoms and abdominal signs described under the recent condition, but in addition there is the firm, fixed, tender swelling to be felt by vaginal examination in the postero-lateral fornix. The diagnosis is easily made from a ruptured pyosalpinx, for the mischief is still localized below the brim of the pelvis, the rest of the abdomen is clear, and the severity of the constitutional reaction is in no way comparable with that observed after a rupture of a pelvic abscess.

The diagnosis, though easy, is important. In the former case, by far the best results follow expectant treatment until the temperature and pain have subsided; operation in the later stage is safer, and less likely to be followed by a prolonged febrile period.

The remaining type of acute abdomen of an inflammatory origin is that of peritonitis at the time of, or immediately after, a criminal abortion. The clinical picture is of a woman in process of aborting, or with the history of just having completed an abortion, very seriously ill, with a rapid running pulse, distension and rigidity of the lower part of the abdomen, and sometimes with a putrid lochial discharge. While it is possible that these symptoms might be produced by a severe acute salpingitis, it would be rare for such a rapid spread of peritonitis above the brim of the pelvis, or for so grave a degree of general symptoms, and the strong probability would be the existence of peritonitis due to a criminal perforation. The history of non-interference in these cases is absolutely valueless as evidence, and should scarcely even be enquired into, for a denial of interference,

however insistent, is proved by repeated experience to be entirely unreliable. Immediate laparotomy is called for, but the outlook is all but hopeless.

The second group in our classification concerns itself with the escape of free blood into the peritoneal cavity, due commonly to a ruptured ectopic gestation, and more rarely to a ruptured gravid uterus, or even a ruptured Graafian follicle. The diagnosis of the urgent cases requires no comment, and is usually perfectly clear. But the subacute cases, with the partial arrest of hæmorrhage and formation of a small hæmatocele, are interesting on account of the very great difficulties they sometimes offer in differential diagnosis from a sub-acute salpingo-oöphoritis. In both cases there is pelvic pain, tenderness of the hypogastrium, and the presence of a firm, very tender, and fixed mass behind and to one side of the uterus. It may be possible to determine the size of the uterus, and frequently there is uterine hæmorrhage with salpingitis, as there is nearly always in the case of ectopic gestation which has ruptured.

The history of amenorrhœa and early pregnancy, so confidently described in the text-books, is very often obscure and by no means typical.

There is one point of difference, however. In a recent case of ruptured ectopic pregnancy, the temperature is not only never raised but it may be sub-normal. In an exacerbation of salpingo-oöphoritis the temperature is almost invariably above normal. On general principles, it is well not to base a diagnosis on too great emphasis of one single symptom, but in these conditions in which the typical history may be wanting and the physical signs almost identical, it is of real value to have even one sign of guidance. The diagnosis, though often difficult, is important. The one condition demands operation to arrest further hæmorrhage as soon as conveniently possible, the

other improves with delay.

Our third group consists of cases of accidents to pre-existing tumours, of which the commonest is torsion of the pedicle of an ovarian cyst. The history is fairly constant of a sudden acute and persistent abdominal pain, gradually diminishing in severity, with sometimes an irregular uterine hæmorrhage. On examination, there are two clinical types. In the first, there is a very tender abdominal tumour, with rigidity, and a varying degree of rise of temperature and pulse. On vaginal examination, it may not be possible to feel any part of the abdominal mass, but the uterus is sometimes pressed down from above in either a forward or backward position, when the tumour is an ovarian cyst.

In the second clinical type there is no abdominal tumour, though a tender swelling can be felt by deep palpation over the pelvic brim. The vaginal examination will reveal a rounded, tender, fixed mass behind the uterus, and crowding it forwards on to the symphysis. Such a tumour is commonly a twisted dermoid cyst of the ovary, but its diagnosis from a hæmatocele or pyosalpinx may be very difficult.

The treatment of tumours with twisted pedicles is invariably laparotomy and removal of the mass, at the earliest convenience of the operator, on account of the gangrene which may quickly follow a tight strangulating torsion. Further, such a mass of necrosis invites a bowel infection, which is to be avoided at all costs by an early operation.

A second accident to which ovarian tumours are liable is rupture, either of the whole cyst, if unilocular, or of one compartment, if multilocular. The early reaction which follows depends upon the nature of the cyst contents. The simple serous fluid of unilocular cysts will cause little disturbance, but the

thick tenacious pseudo-mucin of cyst-adenomata is very irritating to the peritoneum and will set up a plastic peritonitis, with pain and ascites. It is seldom that the rupture of a loculus of an ovarian tumour will cause the symptoms of an acute abdomen.

Apart from rare conditions, there is an interesting change which fibroids may undergo with the production of acute and baffling symptoms. I refer to "red degeneration." The fibroid, previously innocuous, perhaps unnoticed, suddenly becomes extremely tender with acute abdominal pain and rise of temperature. There is also sometimes a peculiarly obstinate constipation which may almost simulate obstruction.

Operation is usually undertaken for this condition on account of the severe pain, but it is questionable whether it is absolutely necessary, for the condition is certainly not one of infection, and it is possible that the symptoms will gradually subside if the tumour is left alone, leading to a gradual shrinkage and absorption. The continued presence, however, of any large mass of necrosed tumour is dangerous and, therefore, it is wiser to deal with it by operation.

The foregoing pelvic conditions are the commoner causes of acute abdominal symptoms, but there are many other rare lesions which have been met with and described; indeed, the possibilities of the pelvic organs in the direction of pathology are all but inconceivable.

The majority of these are curiosities and have little practical importance, but the conditions described are commonly met with and frequently give rise to difficulties in diagnosis and treatment.

The Prognosis in High Blood-pressure.

A SUGGESTION FOR A REVISION OF SOME OF THE
VIEWS HITHERTO HELD.

By A. GRAHAM-STEWART, M.B., CH.B.

Hon. Physician, Seaside Convalescent Homes, Margate, etc.

AFTER a good many years of observation of these cases, having watched many of them through illness and strain, I have come to the conclusion that the views one formerly held are no longer tenable. In other words, I believe the prognosis, with certain reservations, is not so grave as has heretofore been thought.

The reservations are those that refer to fully developed cases of chronic nephritis. Here it is almost impossible to influence—save in a few cases, in which there are, probably, superadded factors—the systolic blood-pressure, except in a very temporary way. Indeed, so much so is this the case that I have come to regard this failure to reduce abnormally high pressure as being almost pathognomonic of the presence of renal disease.

There are times when it is extremely hard to say, with certainty, whether the diagnosis should be merely hyper-piesis or *early* interstitial nephritis; this common failure to influence the systolic blood-pressure is, I believe, a useful diagnostic point, and one of prognostic significance as well. There is reason, however, to believe that one state may merge into the other; often the hard thing to determine is the actual line of demarcation. In a *well-marked* case

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of interstitial nephritis the same difficulties do not exist; here, there is confirmatory evidence, missing in the very early cases of granular kidney, to be found in the macro- and microscopic examination of the urine, and in the examination of the fundi. To that may be added the sign I have above mentioned, viz., the failure to reduce the blood-pressure under treatment, that in simple hyper-piesis is successful, more or less permanent, and efficacious.

Cadbury, after systematic investigation, came to the conclusion that in 75 per cent. of cases of hypertension, renal disease was present. This has not been my experience; but it is possible that cases I am at the present time in touch with may in the course of years develop clear signs of renal disease. I have not found the conclusions, to which Cadbury has come, in the series of cases I have been closely observing for a good many years. The fact that these cases have been under a very definite, and, in my view, a very efficacious form of treatment, may have delayed or prevented the development of actual definite renal disease, indeed, has, I believe, delayed and prevented such development. Hence the importance of putting all cases of hypertension under treatment as early as possible. Accounts of the form of treatment suggested have been elsewhere published.^{1 and 2}

In this article the pressures referred to are systolic only. By that it is not by any means meant to infer that the diastolic and pulse-pressure may be ignored. My belief is that of the school that holds the view that the systolic pressure is probably the crucial factor, but that the other two pressures are often of the greatest importance.

I believe that the great majority of cases of hypertension are toxic in origin, and that probably the source of toxæmia is very often associated with

intestinal stasis. It does not seem impossible that the same source may be the cause of the arterio-sclerotic kidney, and that the effects produced, both on the vascular system and on the kidney, may therefore have a common basis of origin, and that the baneful effects may fall on both systems at the same time. If this is correct, it would dispose of the eternal query in chronic nephritis whether the vascular or the renal changes came first.

If there is a common basis, then there does not seem to be any reason why, if one is able successfully to treat hyper-piesis, and retard its progress—and this can be done—one should not be able to do the same thing in delaying or arresting the degeneration in the kidneys. What so often happens is that one does not meet with the nephritis until it is fully developed. It is an interesting, and, probably not an altogether unfruitful, speculation whether, if all cases of a rising pressure were put soon enough under adequate treatment, the development of renal disease of the sclerotic type might not be very largely prevented.

Reference is made above to an “efficacious” form of treatment of raised arterial pressure. One essential of this treatment consists in the free daily purgation of the patient by means of magnesium or sodium sulphate or a mixture of these. I endeavoured to explain the very good results obtained by suggesting: (1) that they were due to the great abstraction of fluid from the bowel, which, in turn, had its effect on the circulatory system; and (2) that they were also due to the sweeping away of intestinal putrefaction. But in this second reason, for the results obtained, I had not gone far enough. Mere “sweeping away” is insufficient, for other purgatives, equally active, failed to bring about the improvement noted when magnesium or sodium sulphate was employed. For

the further explanation of the beneficent action of these sulphates I am indebted to the writings of Langdon Brown.³ Briefly, his theory is as follows.

Proteins undergo the most changes in putrefaction. Putrefaction seems mainly to affect certain groups—the aromatic bodies and the sulphur groups. Sulphates conjugate with the aromatic products (tyrosin, yielding phenol compounds: tryptophan, yielding indol and skatol) to form ethereal sulphates, which are practically harmless. He suggests that whether such substances do or do not exert their toxic effects depends largely on whether they are free or whether there is sufficient sulphate for them to combine with, in which state they are harmless. This may be the explanation of the value of sulphates in the treatment of certain intestinal diseases; they are not only aperient, but antitoxic. He then goes on to say:—

“The recent discovery by Barger and Dale of diamines set free by putrefactive changes, which raise blood-pressure, may provide us in the future with evidence of intestinal putrefaction as a factor in the rise of blood-pressure in later life.”

Words to the same effect are used in the very brilliant lectures delivered before the Royal College of Physicians in June, 1918. All this has important bearing on treatment and on prognosis.

In any case of high blood-pressure, the first essential is to endeavour to discover whether or not renal disease is clearly present, for on this, to a very great extent, hangs the prognosis. This is not always as easy as the text-books would have us believe. Careful determination of the following points will generally lead to a correct conclusion.

1. *The Urine.*—(a) *The presence or absence of traces of albumen.*—Albumen is practically always absent in cases unassociated with renal disease; a persistent trace is more in favour of granular kidney, and is, I believe, an important diagnostic point. At the same

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time, advanced cases of cirrhotic kidney may show no trace of albumen—a point very often overlooked.

(b) *Large quantities of limpid urine* of low specific gravity are not any more diagnostic of renal sclerosis than of hyper-piesis, especially if the hyper-piesis co-exists with nervous symptoms—and this is an exceedingly common combination. Reduce the blood-pressure and ameliorate the nervous symptoms, and at once the urine greatly decreases. The same treatment will not reduce to any appreciable extent the large quantity passed in granular kidney.

(c) *The presence of casts and renal cells.*—In high pressure *occasional* casts are found (granular casts). What is in favour of renal involvement is the *persistent* presence of these casts in quantity. The presence of renal cells is of greater importance; these point more to definite kidney trouble.

2. *Enlargement of the Left Ventricle.*—In hyper-piesis this is not found to anything like the same extent as in the developed state of cirrhotic kidney. Definite and permanent enlargement is highly suspicious of renal disease. Indeed, the more hypertrophied the left ventricle the greater is the certainty of long established cirrhosis of the kidney.

3. *Accentuation of the Second Aortic Sound.*—My experience of this has been that it is more pronounced when the kidney is involved, probably because the aorta has been involved in a general sclerotic process that has implicated the kidneys, the myocardium, and the vessels generally, but more specially the aorta.

4. *The Presence of Mild Uræmic Signs.*—These point to the kidney, for they are not nearly so much in evidence when there is general arterio-sclerosis only, and not at all when simply high blood-pressure exists.

5. *The State of the Fundi.*—Definite neuro-retinitis is conclusive, *i.e.*, provided it is associated with

other signs pointing to a renal lesion. Generally speaking, flame-shaped hæmorrhages invariably put the case beyond the stage of hyper-piesis. Macular stars are not found in hyper-piesis, and are strongly suggestive of Bright's disease. Even with old-standing cases of hyper-piesis there is no optic neuritis; optic neuritis definitely places the case beyond the pale of simply raised arterial pressure. If definite neuro-retinitis is present, the prognosis of many years ago still holds good, viz., that the patient will not live for more than 18 months. I always have an expert report on the fundi in all cases of high blood-pressure, and my experience is that when neuro-retinitis is conclusively present, the length of life to be expected is far short of 18 months in most cases. It is essential to have an expert examination of the fundi in all high-pressure cases if only for the sake of determining the state of the vessels, which is of immense value in determining prognosis.

If, then, the condition is definitely renal, the prognosis must be based *on the grade of the renal lesion* and not merely on the height of the systolic pressure; this may rise to 260 and even 300 mm. Hg. Excessive heights carry their own dangers.

If, in chronic granular kidney, a long-established high pressure is found to have dropped very decidedly, suddenly, and without apparent cause, the outlook is bad; generally, dissolution is not very far off. This drop is soon almost always associated with or followed by other ominous signs, *e.g.*, uræmia, myocardial failure, diminution in the secretion of the urine, Cheyne-Stokes breathing, and dropsy. Such a drop in hyper-piesis, if too great for the adaptation of the patient, may be and often is associated with signs denoting the absence of the feeling of well-being, but the signs are not ominous, and the prognosis is not made worse, the balance generally being regained.

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The heart that drives behind high pressure is, as Clifford Allbutt said, "stout and faithful to the end"; the heart that has driven against granular kidney for long is robbed of reserve by means of its very hypertrophy. It is a heart more spent and more toxic than the heart that labours behind hyper-piesis.

As regards the *grade* of renal inefficiency, an important and highly suggestive article has been published by Dr. H. MacLean and Dr. A. E. Russell.⁴ Taken together with clinical evidence, the authors lay stress on three tests by the employment of which an estimate of the renal efficiency may be obtained. As an aid to prognosis these tests appear like turning out to be of immense value. Briefly the tests are as follows, but the reader is referred to the original article for the full technique and details:—

(1) Estimation of the urea in the blood.

(2) The new "urea concentration test" of MacLean and de Wesselow.

(3) The diastatic activity of the urine.

The first test gives information regarding advanced cases only. The second test is exceedingly simple; urea is given by the mouth and at different intervals, later on the urea in the urine is estimated; depending on the percentage excreted so does the gravity of the lesion vary. The authors regard this as the most useful functional test of the present day. The urea is estimated by the usual hypobromite method. The third test is not very difficult; a low diastatic value is an indication of renal inefficiency, a high value an indication of efficiency. The authors regard the old phenolsulphonephthalein test as useful but hard to carry out with accuracy. Ambard's co-efficient they do not regard as of great value.

Having, then, as far as possible eliminated renal disease, there still remains that great army, the hyper-pietics and the arterio-sclerotics with raised arterial

tension.

Examination and observation of many cases have led me to the conclusion that in the great majority of cases the highest pressures do not coincide, at least until for long, with decided arterio-sclerosis. Were this so, cerebral hæmorrhage would probably be more common than it is. My experience has been that the worst grades of arterio-sclerosis are very frequently indeed associated with a pressure in the region of the normal; often there is definite hypotension, and with this the risk of thrombosis is greatly increased.

One of the worst prognostic points about any case is the co-existence of sclerosed vessels and high pressure. So far, in ten years of observation of these cases, I cannot remember having seen a single cerebral hæmorrhage in cases under regular treatment; but I have seen it a good many times in the untreated cases. From that it appears to follow that under definite treatment the chances of cerebral hæmorrhage can probably be lessened. This, I believe, to be true. My own experience may be pure luck, and the statement does not refer to established cases of granular kidney.

Probably the greatest number of high-pressure cases comes under the heading of hyper-piesis; that is, they are not associated with either chronic nephritis or with definite arterio-sclerosis. High pressures and good, or very fair, vessels are the rule and not the exception. It is a general idea that the reverse of this is true. On the same footing is the fact that there are many who fear to use digitalis if the pressure is high, and morphia in the dangerous convulsions of uræmia; it is known now that such fears are groundless and dangerous. Yet they are far from being relegated to the limbo of medical myths.

An important prognostic point is, then, the state

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of the vessel walls. With bad vessels and a high pressure a patient is ever on the brink of a precipice; cerebral hæmorrhage looms large on his horizon. Yet much can be done to obviate or to postpone such a calamity. In this type of case—the type with bad vessels—an important prognostic point is the grade of response to treatment. Speaking generally, the response to treatment in this particular type is not nearly so satisfactory as in simple hyper-piesis, and in some cases drastic interference may be a source of great danger to the patient. The demand for a high pressure when the vessels are sclerosed seems more necessary than when the vessels appear practically normal to the finger. This may probably be accounted for through loss of elasticity and of recoil.

In time the high pressure will, no doubt, produce vascular degeneration; I am not certain, however, that this is always the case. It is, therefore, a useful point in prognosis to know if the case has been caught early enough to prevent, in great part if not altogether, the subsequent degeneration that is said to follow in the untreated case. I believe the pernicious effects on the vessels are twofold in origin: (1) from pressures above a certain height for any given case; a lowering of 40, 30, or even 20 mm. may mean all the difference to the vessel walls in the rapidity of the stated production of degeneration; (2) from the effect of circulating toxins. It is of prognostic value if, as regards toxæmia, the blood-pressure clearly responds to the active treatment of intestinal stasis. For evidence regarding the power of stasis to produce a rise in pressure, the reader is referred to the discussion on alimentary toxæmia before the Royal Society of Medicine. Manoelian long since demonstrated that atheroma could be produced in the aorta of a rabbit by injecting repeated *small* doses of bacterial toxins.

As above suggested, a large proportion of all cases

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of raised tension comes under the heading of hyperpiesis. It is mostly in these cases that I think the prognosis must be revised. I think I am right in stating that, on these cases, the profession generally has taken too sinister a view. I state this the more confidently in light of the results I have had, elsewhere published, under the form of treatment I have adopted.⁵ I cannot recall any case of this type, over a large series, that has failed to benefit—sometimes beyond all recognition—by the form of treatment suggested. Of one thing I feel convinced, and that is, that no physician having seen a case but once can give anything even approximating an accurate prognosis until that patient has been for some time under definite observation and treatment.

One has repeatedly seen patients who, on account of a simple pressure of 160, 180, or 200 mm. Hg., have been ordered to live the life of an invalid; cheese, bread, and milk, has been the diet ordered; work has been stopped, and the patient lives in a world of dread, expecting his pressure to “burst” somewhere—as often as not in the brain. The final result to that patient is neurasthenia; he lives in the consulting room and on his readings. A vicious circle is produced.

In hyperpiesis, such a condemnation is unjustifiable; the results of long observation of these cases do not warrant the prescribing of so dark a future. The prognosis is worse in cases that have been so condemned; in the nervous the effect on the pressure is only too real. It is a hard task to allay their oftentimes groundless fears. On no few occasions the relatives are awaiting anxiously for the advent of the dire “stroke” that may never come. Relatives abhor a looming stroke.

A prognosis should never, therefore, be given on seeing a patient for the first time, especially if that

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patient is a woman. It is often impossible to exclude early Bright's disease at a primary interview, and nervousness, fatigue, strain, the climacteric, and worry (especially the latter) may account for a very great deal.

Ten and a half years ago I saw in consultation a lady of 62 years of age. Blood-pressure, 195 mm. Hg. She had obvious shortness of breath, even when lying in bed. The heart was considerably enlarged, the rhythm tick-tack. She had persistent headaches and there was a mild grade of cyanosis. The vessels were degenerate, and she was sleepless and depressed. As fairly onerous duties devolved on this patient, I was pressed by the relatives for a definite opinion on the outlook. I gave it as an opinion that, at the rate she was deteriorating, the chances were that she would not survive for more than a year. That was in 1909, and I still have the pleasure of seeing her occasionally.

In giving a prognosis, special care must be taken in the case of women *at or near the menopause*. These patients frequently develop a systolic pressure of from 160 to 180, and on investigation this rise is found to be of a functional nature, purely temporary, and of all types probably the most amenable to treatment. These cases often present many of the trying symptoms of the highly organic case; frequently, owing to the instability of the nervous system at this time of life, these symptoms are of an exaggerated type. The underlying pathology is probably an endocrine disturbance, associated with emotional states and a hypersensitivity of the nervous and vasomotor systems.

Under suitable treatment, the symptoms arising from the disturbed pressure vanish in a most gratifying manner, and the pressure returns to the normal, but with occasional fluctuations.

During the last two years one has seen many "war" cases in women. The symptoms they present are similar to those of the menopausal cases. Many women, of leisure in pre-war times, have had to turn to and cope with work usually done for them by maids;

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to this increase in physical labour has to be added the anxiety of having relatives in the fighting areas, financial and housekeeping worries, and last, but not least, the strain of air-raids, present and anticipated. Such patients react satisfactorily to treatment, but the improvement is sometimes slow. Both in the menopausal and the "war" cases one has been able to eliminate anything of an organic nature, and the result of treatment has been proof of the soundness or otherwise of the diagnosis of a purely functional and temporary increase in pressure. In those two types I have not seen any pressures over 185 mm.

To give a grave—indeed, anything but a favourable—prognosis in such cases naturally leads to a rather large error; that such an error has been frequently made, and in consequence over-drastring treatment adopted and patients and relatives unduly frightened, must be my excuse for laying stress on this common type of case. I think, therefore, the prognosis liable to be given has to be revised and modified in the light of modern research. That such cases, often occurring as they do in neurasthenic subjects, have been unnecessarily frightened and alarmed is not, I think, open to dispute. Generally speaking, these patients do not show evidence of vascular degeneration, but they may do, even at ages surprisingly young, and this must naturally alter the prognosis whether or not the raised pressure responds to simple as opposed to more drastic treatment.

In such functional cases, the use of vaso-dilators is strongly contra-indicated. The bromides (10–15 grains of the sodium salt three times daily), the occasional use of ammonium hippurate (5–7½ grains two or three times daily), rest, gastro-intestinal purification, and superficial psycho-therapeutic treatment are the means I have found the most useful in securing good results. The prognosis is definitely

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and uniformly good. It is almost unnecessary to say that the more psycho-neurotic the patient, the less should she hear of the ominous-sounding "blood-pressure." More than once have I had to regret using the term.

The following case is an instructive example of the type in which often a serious prognosis is given—not, it would appear at first sight, unreasonably:—

The patient, æt. 65, was seen first in January, 1909. At that time she was suffering from persistent headaches, the cause of which had been so far undiagnosed. They had lasted for two years. There was no gross degeneration of the vessels, and the cardiac impulse was in the normal position. The pressure was 205, and the cardiac sounds were poorly spaced. The urine was normal. There was obvious shortness of breath on mild exertion, and frequently the cardiac rate was much in excess of the normal. The malar venules showed very definite turgescence, and an obvious cyanotic tint was present in lips, cheeks, and ears; on stooping this was pronounced. Her condition was that of a semi-invalid. In these cyanotic cases the prognosis is not generally good; more on this account, perhaps—together also with the dyspnœa—than on other things one felt rather anxious about her future, especially regarding intercurrent illness. In fairness it should be said the patient persisted in regular treatment, and one was able to keep the pressure from 20 to 30 mm. below the original level. To-day, nearly 12 years having elapsed (she is now 76), this patient is able to walk a couple of miles and to go up hills. In these 12 years she has come through the following illnesses and accidents: follicular tonsillitis, twice (once most severely); influenza, twice; lobar pneumonia accompanied by severe pleurisy: and she has had two accidents, one a bad fall, resulting in a deep scalp wound, and once she was heavily thrown from a runaway bath-chair, sustaining extensive bruising, the fracture of several ribs, and much shock.

Such cases, seen in the stage of cardio-vascular decompensation, are very liable to lead one into a too grave prognosis. In this particular case the persistent mild cyanosis seemed in itself a point much in favour of not too cheery an outlook.

Four years ago I saw Mrs. B., æt. 49. Menses had ceased 18 months previously. She complained of thumping in the region of the heart and pulsation all over the body; in her own words she felt "bursting all over." Giddiness, tightness across the chest, dyspnœa, and easy exhaustion were all present in pronounced degree. The cardiac impulse was 2 inches out, and she was having

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many attacks of cardiac asthma: often at night she had to sit up and "gasp for breath." The second aortic sound was clanging, and the vessels in the neck were throbbing visibly and violently. Systolic blood-pressure 245 mm. Radial and brachial vessels moderately sclerosed. Retinal condition: calibre definitely reduced, discs slightly pallid, banking of the venous return through crossing arteries. The urine was normal. Altogether the patient was a very ill woman, and her state was typical of many a case first seen, at this stage, in the consulting room.

Here, I think, the giving of a grave prognosis might have been an easy matter. There was a combination of some none too happy symptoms—a systolic pressure of 245 (perhaps evidence of a long-standing "pre-sclerotic" stage of high pressure), a 2-inch displacement of the cardiac impulse, definite general and retinal sclerosis and, probably most evil-reputed of all, a clear history of many attacks of genuine cardiac asthma. The patient faithfully carried out the treatment suggested, and for these four years she has been practically free from all vascular symptoms. The cardiac impulse is now in normal position, and the blood-pressure varies from 190 to 210 mm. It is mostly 200. Examination of the retinal vessels a year ago showed distinct retrogression in the vascular changes noted three years previously. Some years ago I think this retrogression would have been regarded as impossible. The patient now gets about wonderfully well, but exhaustion is still somewhat easily produced.

Fortunately for this patient, she can live a life of complete ease; otherwise the prognosis would be very different. And this, I think, is a most important point in the outlook in such a case—what kind of life can the patient live? A life of ease, with the power of being able to procure everything that may be desirable, and a life sheltered from worry—this is the ideal state for influencing the prognosis favourably. Given the converse conditions, the outlook is greatly altered. For an arterio-sclerotic with a high pressure, I should say the most maleficent factor that can enter into his or her life is—worry.

From a prognostic point of view the following case is also of interest:—

Ten and a half years ago I saw Mr. P., æt. 53. The pressure was 210 mm. systolic, 100 mm. diastolic; very definite arterial changes were present. Three months ago he was again seen. During this long interval, six years ago he had a right hemiplegia from cerebral hæmorrhage but made a good recovery; he had also one attack of gastrostaxis. When seen three months ago the pressure was 235, the patient was flushed, could not easily concentrate his mind, was tremulous and suffered from giddiness daily. For many years the pressure had not been below, and was generally above, 220 and this figure was regarded as his "normal." For two years he had been taking two grains of thyroid extract daily. This was at once stopped, and bromide and ammonium hippurate substituted. In a few weeks the blood-pressure had fallen to 190,

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and all disagreeable symptoms had passed off. Although I think that small doses of thyroid (gr. $\frac{1}{4}$ — $\frac{1}{2}$ daily) have a valuable and most beneficial effect in arterio-sclerosis, yet when the pressure is high, care has to be taken with this substance, for I believe it can have a powerful effect in raising the pressure, especially if the dose exceeds gr. $\frac{1}{2}$ daily. This is a case in which a patient with a high pressure and very definite arterio-sclerosis has, apart from the occurrence of a single stroke, carried on satisfactorily for over $10\frac{1}{2}$ years from the time the diagnosis was made. With the pressure (average 220 for many years) and the state of the vessels a serious prognosis 10 years ago would appear not to have been unjustifiable. It is not generally a good type of case.

The following are typical cases, and the type in which, in my view, one cannot with certainty give a correct prognosis without having had the patient under observation and treatment for some time. Were one to go on what one observed at the primary interview, a grave error in prognosis must inevitably result.

One patient, æt. 39, was seen a year ago. She was complaining mostly of headaches, easy fatigue and shortness of breath. Pressure 160. Through lack of servants during the war, the strain of many air-raids, much pain from severe hæmorrhoids, and a good deal of worry, this patient was nervously exhausted. The piles were removed, and the patient had three months' rest in a nursing home. From that time the blood-pressure has never risen above 130. It was 160 for some time.

Mrs. K., æt. 36, seen nine months ago, complained of easy exhaustion, headaches, much palpitation, noises in the ears, and some shortness of breath on exertion. Pressure 160. There were no organic signs to be made out. After treatment for a month by rest, bromides, suitable diet, and mild aperients, together with the elucidation and settling of a mental conflict, the pressure fell to the normal and has not since risen above that level. The only ætiological factors were lack of sufficient domestic help and a worrying mental conflict.

I believe that in most of these cases the predominating exciting factors are two in number: (1) Worry. (2) Over fatigue with insufficient rest. Emotional factors play an enormous part, and must be allowed for. For that reason, the pressure of any patient should be taken—especially in the case of a strange patient, and still more so in the case of a nervous patient—at the beginning and at the *end* of the

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interview. At the end, when the patient is calmer, it is nothing unusual to find a drop of from 10 to 30 mm. To omit this simple expedient may and can lead to an error in accurate diagnosis and prognosis.

Finally, a word about a type of case that seems to be of a more or less functional nature, and that depends on auto-intoxication for its ætiology. I refer to the cases of raised pressure in which the cause appears to be due to the absorption of alimentary toxins produced by the presence of intestinal stasis. Apart from the evil effects elsewhere in the body, I believe that under suitable treatment the effect on the actual blood-pressure is more temporary than permanent, although the same remark cannot perhaps be held to apply to the effects on the vascular coats.

If the alterations in pressure are due to this cause, and there does not seem reason to doubt it, the prognosis depends on the response to treatment directed to the bowel, and not on the actual pressure. With the purification of the bowel uniformly good results are generally obtained. I have obtained the most satisfactory results from the employment of the following *régime*. (The very bad cases in which there are adhesions and kinks, emaciation, and more or less continual abdominal pain, dragging or discomfort, together with a grave state of the general health, do not benefit in the same way, for the matter has then become surgical.)

First of all, a pure paraffin, one ounce morning and evening, and a varying dose of a mixture of magnesium and sodium sulphate are prescribed for daily use. A "Curtis" belt is ordered, and if the evacuations are incomplete and offensive, and especially if much mucus is present (the only reliable way of making sure of these details is to inspect the motions of the patient oneself), the bowel is thoroughly irri-

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gated daily with large quantities of saline solution, an enema with a non-irritating soap having been first given. The fæces are completely investigated, and a vaccine prepared and given weekly over a long course, in slowly increasing doses. The patient is instructed in a few simple exercises for toning up and strengthening the abdominal muscles, and abdominal massage is employed as well.

For those who are interested in blood-pressure cases, I would suggest that, for accurate prognosis, one of the great aids is frequent and regular estimation of the systolic, diastolic, and pulse-pressure. I think the only accurate way of estimating the diastolic pressure is by the auscultatory method as opposed to the method by oscillation. Another help is the systematic taking of notes, the recording of the pressures on the special charts prepared for the purpose, and, perhaps above all, the regular watching of these patients over as many years as possible. To watch their reactions to treatment, their behaviour during intercurrent illness, their progress and fluctuations through stress and strain and worry, and to act accordingly, is not only of great benefit to the patient, but is probably more useful than anything else in helping the physician to come in time to a fairly accurate prognosis in an oftentimes difficult and uncertain type of case. And even then, after careful watching and much experience, many a calculation, many a forecast, will be rudely upset.

Never in acute pneumonia should one omit to take the blood-pressure. Lately I saw a lady of 70 on the third day of an acute type of pneumonia. I found her pressure was 260 mm. She came through satisfactorily, as many high-pressure cases seem to do, contrary to what one would expect theoretically. The important point is this: a sharp drop in pressure during the illness is an evil sign, and the greater the

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drop the more evil the sign.

Another point of considerable clinical importance, both as regards diagnosis and prognosis, is the very great aid given by the sphygmomanometer in helping the sometimes difficult differentiation between cerebral hæmorrhage and cerebral thrombosis. At the present day, there does not seem to be any justification for omitting this simple procedure. The blood-pressure in these cases is probably the most reliable diagnostic point we have. If the patient has a systolic pressure of 100 or 110, we may feel pretty sure that hæmorrhage is not the cause of the cerebral lesion. If the pressure is a high one—and the higher the more the certainty—we may feel equally confident regarding the unlikelihood of thrombosis. It will probably make all the difference in the true prognosis if venesection is performed in the thrombotic case and stimulants are vigorously plied in the hæmorrhagic.

After trying many different types of instrument I have found some unreliable, some painful in application, and others a perpetual nuisance. The two I have found the most convenient and the most reliable are, for the pocket the "Tycos," and for the consulting room the "Tycos" or French's modification of the Riva-Rocci instrument. It is always well to have a mercurial instrument so that other types of instrument may be tested by it.

One could cite many other cases in support of the views expressed in this article. The cases above described have been taken from a large selection, and have been chosen, not as isolated or rare cases, but simply as illustrative of different types.

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Some Uses and Doses of Hypnotics.*

By F. WYATT-SMITH, M.B.

THE original and unorthodox experiences of a retired, but active, general practitioner in a somewhat hidebound branch of the profession should be interesting, and may prove useful. It was with a view to leading a regular and fairly easy life, with little night work, that I selected lunacy as my contribution to war-work. After having been the bane of three different superintendents for nearly three years in all, I was fortunate enough to get entire charge of a somewhat similar institution where I could test my beliefs without let or hindrance, and the results were so surprising that I venture to put on record the gist of those beliefs, as I hold them to-day, so far as they differ from what I take to be the *generally* received opinion on the subject.

To begin with *Opium* and its derivatives. Opium should never be regarded as a hypnotic. It is only by substituting other and purer hypnotics for opium that, so far as I can see, modern medicine has advanced beyond the days of Augustus in its teaching on the treatment of insanity.

Personally, I have never used opium as a hypnotic except in the last stages of hopeless orthopnœa, and I do not think it ought to be used, even as an analgesic, except, of course, also in hopeless cases, unless the cause of the pain is known to be transitory or quickly removable.

It is still used in psychiatric practice by some

* Based on a paper read before the Harveian Society.

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physicians, but I have never known any good result from its exhibition there. On the other hand, I have once experienced what threatened to be disastrous results from its administration to one of my cases, for, with that friendly carelessness which is all too common a practice in our asylums, a patient of mine, who was doing very well on sulphonal, had the drug suddenly substituted by opium without my being made aware of the fact. Three days later he was in a very unaccustomedly irritable state, restless and threatening to become violent. The attendant was able to supply the cause, and a return to sulphonal put the matter right in a few days.

I repeat, opium ought not to be regarded as a hypnotic, and I believe that those who refuse to do so are justified in denying that there is any such thing as a drug addiction to a hypnotic; for no pure hypnotic ever leads, so far as I have been able to learn, to such a craving for itself as cannot be removed by the simple process of substituting another for it until the cause of the compelling insomnia is withdrawn. It is quite natural that sufferers from a torturing insomnia should use their favourite hypnotic to excess, and even to the point of killing themselves with it, and the enormous doses of these drugs they have to take to achieve this purpose is only an argument for their comparative safety. But, under proper control, especially if the patient is not allowed to know what drug he is taking, and more especially in a scientific institution, there should be no danger whatever in the administration of any hypnotic, in any dose that may prove necessary, for any reasonable length of time.

If this were not true, and there were danger of addiction to these drugs, the danger would be worth running, as Mercier says of hyoscine, in preference to that, sometimes the certain alternative, of allowing

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our patients to die from the exhaustion of sleeplessness.

The Bromides.—I take these salts next, because I place them in the same category as opium in so far as to deny them a right to masquerade as hypnotics. Though I could tell many funny stories of fatuous confidence in the sleep-compelling powers of this class of drug, in which the public and so many of the profession still believe, and though I have seen it used literally by the hundredweight and have used it myself in all doses up to half an ounce at a time, *per rectum* in delirium tremens, I have long ago abandoned all faith in it as a hypnotic and reserve it only for epileptic and gynæcological practice, though I now expect sulphonal would probably prove more efficacious in the gynæcological cases.

I will next dismiss *Amylene Hydrate*, not because it may not prove an excellent—perhaps the best—hypnotic in certain selected cases, but because I myself know nothing about it at first hand. I once had a patient who had done better on it than on anything else and, in fact, had been quite normal as long as he continued to take it; but, owing to some gross carelessness in the measuring out of the doses, he and others had been well-nigh poisoned on one occasion, and so the drug was condemned and absolutely withdrawn. The house had been set on fire, so no light was to be lit in it. But we have so many hypnotics to choose from, that I have always been able to do without it; and, moreover, it is so costly that I have never felt justified in using it at the public expense.

While on the subject of expense, perhaps we may consider *Chloral*, as being the cheapest of the hypnotics for prolonged use. Chloral is one of the many hypnotic drugs for whose deadly powers the profession has had a profound respect since the days of its first introduction. Nowadays, I believe, this fear is modified to a dread only of its possible evil

effects in cases of fatty degeneration of the heart. That dread may be well founded. I do not know. I can only say that I have often used it in such cases in doses of at least 20 grains three times a day for many days in succession, not, I admit, without anxiety, but without, so far as I have ever known, or had reason to suspect, injurious result. I am not one of those—of whom, I fear, we have too many—who prefer standing by with folded hands while our restless patients exhaust themselves to death rather than take some risk in trying to save their lives. I have often thought that, perhaps, the British public would be safer if, as in South America, we had no coroner.

Of *Veronal*, I have had little personal experience beyond the pharmacopœial dosage, within which it proved almost useless in my hands. During my days of tutelage, I was not allowed to exceed 15 grains a day on account of its supposed poisonous properties. As Voltaire said of coffee, it must be a very slow poison, for alcoholics, its chief votaries, appear to take it in very large and ever increasing doses for long years in succession. If they finally poison themselves with a single dose of some 125 grains or so, who can wonder at it? By the time I had escaped from bondage, and was free to fight disorder with an unsheathed sword, I had learned to rely for my results on better remedies than veronal, and had no use for it, or trional or tetronal, or any of the other-als except sulphonal. In my belief, we have far too many hypnotics, just as we have a bewildering number of members of every other group of medications. Surely it is better to learn something definite about the powers and behaviour of two or three dozen plain and simple drugs, which is all that most men really have time for in a medical life, than to trifle with some hundreds of the curiosities of

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medicine.

Paraldehyde is the only hypnotic a supposed addiction to which I have ever been able to see in the flesh. The man had long been awaiting discharge, except that he dreaded to take paraldehyde on his own responsibility and believed that he could not sleep without it. I proposed to him that he should try to sleep with his accustomed dose on the locker beside him, only to be taken if he found it really necessary to do so. He went out in a few weeks, not, I believe, having touched it since. It is a drug very blessed to the timorous, for it is on all hands allowed to be non-toxic. Yet, on asking a friend, who was in charge of a hospital for "shell-shock" cases, what dose of it he used, he answered, carefully, "from 60 to 90 minims," and looked depressed when I told him that, on occasion, I give half an ounce of it at a time, having learned, from an old lady who had been charge nurse in an observation ward for many years, that it may safely be given in that dose every four hours. It is a useful drug for quick action, though often large doses are required, and here it shares with most other hypnotics the drawback of an objectionable taste which makes it difficult to get down in bulk, especially in resistive cases. As a chronic "night-cap" for cases for whom a drachm or two is sufficient, it is generally the most satisfactory of all its congeners. My experience of it does not confirm the belief of some that the *initial* dose is apt to cause excitement in alcoholics.

Sulphonal, in many ways the most useful of the hypnotics, holds a place only second to hyoscyne in the dread with which it is regarded by prescribers. In addition to all the terrible stories of its fatal action recorded in the books, one of my superintendents insisted that he had heard of a case of fatal poisoning by 30 grains *taken in divided* doses, though he could

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not give references. I have even been, myself, accused of producing hæmatoporphyrinuria (the very word is enough to make your knees give way beneath you), though I have never seen the psychiatrist or pathologist who has come across a case. The insolubility of sulphonal is always quoted as adding to the danger of its accumulation; and so I prefer to give it in divided doses, as making it easier to withdraw when signs of the limit of its usefulness in any case are being reached. For the same reason, a finely triturated powder is to be preferred, theoretically, though I must admit I have never seen trouble arise from a coarse one. There are said to be dangerous idiosyncrasies as to the dosage that different patients can stand. This I do not believe, at any rate within reasonable limits. Doubtless a healthy individual would be far more affected by the same dose than one in dire need of it, but the same is true of all drugs. Its greatest disadvantage is its insolubility, and hence its slow absorption and delayed action. Its second is its great cost. If its value were better appreciated, and it were used in greater quantities, doubtless its price would be brought down. It has one great advantage over the other hypnotics in its tastelessness, and hence its easy administration in bread and butter without the patient's knowledge.

Even when using it as a pure hypnotic, merely to produce sleep at night, my practice was to administer it in evenly divided doses through the day, reducing these till they only procured sleep at night and not drowsiness in the day as well. This practice soon brought me to the conclusion that sulphonal is the only really mental sedative we have, for, apart altogether from the tranquillizing effects of sound sleep, it seemed to me to have a very soothing effect on the general mentality of most of the patients who used it, whether they suffered from sleeplessness or

not. Perhaps the best case that occurs to me in illustration is that of a patient who had been long an inmate leading an active, intelligent, almost an intellectual, life, and taking a small dose of sulphonal for a long time—10 grains a day for years, I believe. This fact had, somehow, been completely overlooked. When it was discovered the sulphonal was withdrawn, and in three days the patient was grinning in a padded room with the wreck of his clothes around him and a rubber chamber utensil on his head. I understand he died in a few weeks.

As for the dosage of this drug, I learned it from one of those alcoholic supermen whom I was fortunate enough to meet early in my psychiatric career. My friend was a medical dipsomaniac, who had been refused admission without certification, and whom I undertook to treat outside. His bouts were long enough to produce a torturing insomnia which, according to himself, only alcohol and sulphonal could conquer. His practice was to begin by taking 40 grains, twice a day if necessary, to procure sleep, and then to continue with 20 grains three times daily until the anti-body had been eliminated, which required three or four days after the withdrawal of the alcohol.

Profiting by his experience, and following his lead, my practice in my early days, say, in a case of acute mania, would be something like this:—I would begin with a mixture, given by tube if necessary, of, perhaps, 2 ozs. of castor oil, 2 minims of croton oil, $\frac{1}{2}$ oz. of paraldehyde, and 40 grains of sulphonal; the hope being that the paraldehyde would act even before the oils, and that some of the sulphonal would begin taking effect before being expelled by them. I never gave large doses to a constipated case without purging, but when the bowels were acting freely, I did not hesitate to give 40 grains whenever I thought it necessary, though I do not

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remember to have given that dose twice in the 24 hours. Six hours later I began 20-grain doses of sulphonal alone, three times a day, gradually decreasing the dose as opportunity offered. In this way I was admitted to have got a quicker and better result with an old-standing case of recurrent mania, who had been sent in, for about the thirteenth time, from a private asylum where he had done £30 worth of damage to the padded room, than had ever been obtained before with him in the history of either institution. A drachm a day was my usual dose at the beginning of a case, and, as I have explained, I generally preferred three doses of 20 grains to two of 30, except in tube cases.

And here I am reminded to parenthesize a note on tube feeding. Little of this will be necessary if hypnotics are properly used. Of the 500 patients, all new cases, under my *sole* charge, not more than some half dozen or so ever required it at all, and none of these more than once or twice; whereas at one institution, not a large one, where I served, we were never without them, and sometimes had many at once. Moreover, they were fed three times a day, sometimes for week after week, if not month after month. This, I am sure, is a mistake. Twice a day is quite enough for short cases, and three times is too many, if they are to last a long while.

I should, perhaps, remark that I have often wondered whether both paraldehyde and sulphonal were as strong in their action during the war as they had been before it, when supplied by Germany.

But I have not had to resort to large doses of any hypnotic since learning the powers and virtues of *hyoscine*. This is the most dreaded drug in the Pharmacopœia, where its dose is given as from a 1/200 to a 1/100 of a grain. So paralysing was the fear I had inherited of it, that I had never used it

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in my life, and asked with interest, on first entering on asylum duties, if it was ever given there. I was told: "Oh, yes. When necessary." Yet in all my experience of them, extending to three, containing amongst them over 6,000 patients, and ranging over more than two years, I have never once known it to be used by anyone there but myself.

My first case was that of a girl sent in by a London hospital, in a Plaster of Paris spica for a broken thigh, because she had become unmanageable. She was sleepless, noisy, continually throwing herself about to the great detriment of her fracture; resistive, refusing food, which she spat out over the nurses, and generally creating an intolerable disturbance. I had no idea how long she had been exhausting herself, or how long I might reasonably expect her to last. But it was, obviously, a case that justified desperate measures to ensure immediate results. With some anxiety I gave her an injection of 1/100 of a grain of hyoscine hydrobromate, and waited to see the result. From all accounts of the drug's behaviour I was expecting something very definite to happen within ten minutes at latest, and I felt rather foolish when nothing happened at all. So, three hours later, I ventured on a second dose of 1/100 of a grain. But, again, nothing happened. Again, in three hours I gave her 1/100, and again nothing happened. This was too ridiculous, so, at the end of the fourth three-hourly interval, I ventured on a 1/75. Whether due to accumulation, or why, I cannot say, but this, at last, was followed by a comfortable little sleep of a couple of hours or so, out of which she awoke quiet and much more amenable to treatment, for she took a good dose of sulphonal in milk and beef tea, and presently made a good recovery without requiring any more hyoscine. This case "gave me furiously to think," and I began to hope that I might be on the eve of a great discovery. And so it was, for I soon found that I could use the drug with confidence and safety up to a 1/50 of a grain.

But my "experiences"—I always use the word in the French sense of "experiment"—brought me under such grave suspicion, that I appealed to a recognized consulting psychiatrist for support. Instead of support, I met with a grave rebuff. "All I can tell you," he said, "is that I once ordered a 1/100 of a grain of hyoscine for a woman in private and she died." "Fortunately for me," he added, "I had taken the precaution to tell them to give her a bowl of soup before the medicine, and they had not done

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it. That saved my bacon!" This was such an extraordinarily unscientific *non-sequitur* that I was too polite to ask whether there had been a *post mortem*, what the poor woman died of, whether he himself administered the injection, if not, who did, and, finally, how much had really been injected?

But I was presently comforted by discovering in the "Text-book of Insanity," by that free-lance and independent genius, the late Dr. Charles Mercier, this remark on page 202 of the second edition of that interesting work:—

"The usual doses (of hyoscine)— $\frac{1}{200}$ and $\frac{1}{75}$ of a grain—are of no use in acute insanity, and at least a $\frac{1}{50}$ should be given under the skin, or a $\frac{1}{30}$ by the mouth. I give $\frac{1}{25}$ hypodermically, and have never seen any ill effects from its use. Ill effects, and fatal effects, used sometimes to attend its use when the drug was first introduced, but no case has been reported of late years, and I cannot help thinking that when it has been fatal, either the drug has been impure, or it was insufficiently mixed, and larger doses were given than were intended. At any rate, if there is any risk attached to its use now, it is a risk that ought to be run, for the danger of the drug is in any case not so great as the danger of allowing the patient to die of exhaustion; and therefore it should be given."

Armed with this very redoubtable shield against the possible inquisitions of a coroner, I resumed my former practices with every confidence, and had the added satisfaction of feeling that it was some comfort, also, to my unfortunate proctors.

Another circumstance which added greatly to my confidence and comfort about this time was a visit from an old-time asylum medical officer who told us that he, suffering acutely from advanced and complicated *morbus cordis*, with anasarca, dyspnœa, orthopnœa, and obstinate insomnia, tried hyoscine up to a dose of a $\frac{1}{75}$ of a grain, and found it quite the most satisfactory of all the hypnotics he had tried, as it not only gave him quiet, peaceful, and refreshing sleep, but, after it, he was even able to go to sleep a second time after having been called up

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to a patient nearly a quarter of a mile walk away, and he invariably awoke with positively no unpleasant after effects whatever. Unfortunately, he found the drug completely lost its effect after some dozen or 14 doses.

Besides the friend just mentioned, I have only heard of two men who use the drug. They were youngsters in Army practice during the war, and both used it in doses of $1/50$.

But it was not only within the walls of the asylum that I caused consternation. On one occasion, having accepted a case from a general practitioner, he asked, by telephone, how he was to bring her up, seeing that she was very violent and resistive. "Give her a $1/50$ of a grain of hyoscine under the skin," I said, and I could hear him gasp along the wire. "But," he objected, "she has already had an awful lot of bromide." I was able to assure him that would not make any appreciable difference, and, presently, as he helped her up the steps, he remarked, in an awe-struck aside, "She is dreadfully drowsy." On this occasion I am afraid my politeness deserted me, and I could not refrain from asking with what object he had given her hyoscine. Why will men persist in giving drugs in the hope that they won't act?

I presently had the pleasure of meeting a case of what anyone would be justified in taking for that rare disorder, acute delirious mania, for the man had suffered for some days from obstinate constipation, absolute insomnia, fever and delirium. Had he died the diagnosis would have been confirmed, for the disease is held to be fatal, yet shows no pathological signs.

His organs, so far as I could find, were normal, so that had he died after an injection of hyoscine I do not know how I could have disarmed the suggestion of having killed him. However, I took the chances

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of a coroner's inquest. One injection of gr. 1/100 gave him $3\frac{1}{2}$ hours sleep, but he became worse. A second injection, and this time gr. 1/33, produced refreshing rest though it did not send him to sleep, and a third, this time only 1/50, saw him through his illness.

Still more reason have I to recommend it in cases of delirium tremens. The effect here, is almost magical, for only amyl nitrite and apomorphia, in the whole range of our medical armament, can produce such immediately striking results as hyoscine.

We had a case early in my war-time experience, when neither my colleagues nor myself had read Dr. Francis Hare's "Alcoholism," and none of us seemed to have more definite views about the cause and treatment of D.T. than had been in vogue when I had been in practice in South America.

As not uncommonly happened under the old *régime*, the patient, though a young and otherwise healthy man, died. Later on I became acquainted with Hare's original and authoritative work, and looked forward to controlling the delirium in my next case with alcohol. But D.T. was not common during the war, and I had to wait years before another case presented itself. Then, as so often happens, two turned up together. By that time I was on my own responsibility, and the only restriction put upon my liberty of action on taking up my duties had been a strong hint that the Committee objected to the use of alcohol in the Institution. In spite of this, had it not been for what I then knew about the powers of hyoscine, I should have felt it my duty to use alcohol according to Dr. Hare's suggestion, with a view to saving the patient's life, when my first case presented itself :—

A strapping Australian ex-soldier, æt. 40, 50 hours after deprivation of alcohol, was admitted, excited, agitated, violent,

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and very deluded and persecuted, to a padded room, on December 20, 1918. Besides large doses of sulphonal, I administered to him one dose of gr. 1/100 and then four doses of gr. 1/33 each, in quick succession, and the man was normal on December 23, 1918.

This man was in good condition, and scarcely caused anxiety. Not so the next, fat, bloated, and a soaker all his life. A bad subject for any disease, and most unpromising as a D.T. Admitted as an "epileptic," without a history, 66 hours after deprivation he developed D.T. on the evening of August 29, 1919, but two injections of hyoscine, the first of gr. 1/33, and the second of gr. 1/50, put him right, and he was practically normal on the morning of August 31, 1919.

To recapitulate my deductions shortly :—

1. I do not believe there is any danger of producing an addiction to hypnotic drugs by their intelligent medical use.

2. Opium, and its products, should never be regarded as hypnotics.

3. The bromides are of little practical use as such.

(4. Bicarbonate of soda and night-socks have far better right to the title.)

5. Chloral hydrate is, perhaps, the most generally useful of the cheaper hypnotics; and is, probably, not very dangerous even in cases of fatty heart.

6. Paraldehyde is the best mere nightcap in mild cases, and is useful in a dose up to half an ounce with the first dose of some other hypnotic, such as sulphonal, to anticipate its coming into action.

7. Sulphonal is, except for its high price, the best of our hypnotics in that it is also a decided mental sedative. It appears to be quite safe in doses up to at least a drachm a day, given in divided doses of 30 grains n. and m., or, better, of 20 grains t.d.s.

8. Hyoscine is our strongest agent in a hypnotic emergency, and is quite safe up to a 1/50th, and probably up to a 1/33rd of a grain, hypodermically. It should be given an extended trial in acute delirious mania and in delirium tremens.

Idiopathic Purpura.

By E. J. BRADLEY, M.C., M.A., M.D., B.Ch.

Stafford ; late Senior R.M.O., Bristol General Hospital, etc.

DEFINITION.

PURPURA may be defined as a condition manifested by capillary hæmorrhages, which are not necessarily connected with any trauma, but are in all probability due to a pathological lesion of the endothelium.

ÆTIOLOGY.

Since 1893 it has been known that, in the condition known as purpura hæmorrhagica, the number of blood platelets was considerably reduced. Incidentally, such a reduction also occurs in enteric fever, lymphatic leukæmia, and occasionally in influenza. Work by Ledingham¹ and Watabiki² has shown that purpura may be produced experimentally in guinea-pigs by injection of an anti-blood-platelet serum. The method they employed may be briefly described. Blood is drawn from a guinea-pig and the platelets isolated by fractional centrifugalization, an emulsion being made in sodium citrate glucose solution. The anti-blood platelet serum is produced by repeated injections of this emulsion into another guinea-pig at intervals of 5 to 10 days. The animal is killed 8 to 10 days after the last injection, and the whole blood taken for preparation of the serum.

Injection of this serum into another guinea-pig produced in a few hours great reduction in the number of platelets in blood, and the coagulability of the blood was much reduced, but not altogether abolished. Further injections caused typical pur-

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pura involving various organs, occasionally with a fatal termination. Finally, immunization against this serum is possible by repeated injection of small doses at suitable intervals.

MORBID ANATOMY AND HISTOLOGY.

Any part of the body, and any structure with a capillary blood supply, may be affected by purpura. Histology shows that the local hæmorrhages may be due to damage to the endothelial cells of small vessels. Another possibility is that agglutination of red blood-corpuscles causes capillary obstruction and consequent hæmorrhage.

NOMENCLATURE.

The text-books classify idiopathic purpura in five groups: Purpura simplex, purpura hæmorrhagica, purpura fulminans, purpura rheumatica (or Schönlein's purpura), Henoch's purpura.

A study of the notes in some fifty cases of purpura in children leads me to the conclusion that the only real differences in all these types are of locality and degree. Purpura simplex and purpura hæmorrhagica merge into each other indistinguishably. In Henoch's purpura there is simply severe hæmorrhage affecting rather an unusual site; and, in all probability, the joint-pains and swellings in Schönlein's purpura are due to synovial leakage and not to any rheumatic infection; moreover, none of the other classic signs of rheumatism is found. Finally, to label purpura as fulminans is merely a distinction in degree.

It may be stated, then, that purpura is a systemic disease, cause at present unknown, and that arbitrary separation of its varying degrees is a mistake. One might as well classify pyæmia as cutaneous, sub-cutaneous, and articular, etc., according to the distribution of the abscesses. Purpura of mild degree

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frequently occurs in septicæmia, lymphatic leukæmia and iodide poisoning, and in these cases a definite toxin is at work.

The relation of idiopathic purpura to hæmophilia and the hæmorrhages of the newly born, and to such diseases as angeio-neurotic oedema, intermittent hydrarthrosis and urticaria, where serous leakages occur, is a matter of great interest. It is possible that some common fundamental pathological change lies at the origin of this group of diseases.

The hereditary characteristics of hæmophilia, and to a lesser degree of angeio-neurotic oedema, intermittent hydrarthrosis and urticaria, are well established, particularly the peculiar type of transmission through the female in hæmophilia. But I have found no mention of a familial tendency in the case of purpura. It is, therefore, of considerable interest that out of fifty-one cases collected three should have been from one family—all of mild severity.

CLINICAL ASPECTS.

The disease manifests itself sometimes at a very early age. The youngest patient in the present series was 5 weeks old; 6 out of 51 were infants under 1 year of age; 16 were children under 5 years of age; 24 were between 5 and 10 years, and the remainder over 10 years of age. Nearly one-half ($\frac{5}{11}$) of the fatal cases were in infants. No predisposing factor or exciting cause was noted. Nor does it appear possible to prognosticate the course of the disease, since what at first seems a mild attack may relapse repeatedly; or the disease may manifest itself in one single severe attack.

Of 51 cases, 11 died; 22 were of the relapsing type; 18 had, as far as could be ascertained, only one attack.

The commonest type was that in which the skin only

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was involved—20 cases; whilst skin, nasal and buccal mucous membranes were involved in 12. But, even in the present small number of cases, hæmorrhages were observed in the brain, stomach, liver, kidneys, large and small intestine, suprarenal bodies, testicles, pleura, pericardium, heart-muscle, and joints.

There was, in the mild type, little or no constitutional disturbance. Occasionally, onset was marked by a day or two's pyrexia, and, even in severe cases, pyrexia was by no means common, and always irregular.

In fact the symptoms produced were entirely due to the amount of hæmorrhage, or to local disturbances produced by it. Hæmorrhage from the alimentary tract was the most common cause of death—hæmatemesis in two; hæmorrhage into the coats of large intestine, with signs of obstruction, in two; and hæmorrhage into the lumen of the intestine in one. In the remaining fatal cases the hæmorrhages affected many organs.

It is interesting to note that the hæmorrhagic tendency appears to remit in the intervals between relapses. Thus, in one case, tonsillectomy was performed between two attacks without any trouble.

The course and duration of a severe case may well be illustrated by the following:—

L. W., æt. 4, male, was admitted with a history of hæmaturia and purpura of the skin, the purpura having first appeared two years previously and having recurred at varying intervals since.

The present attack was heralded by epistaxis and hæmaturia. The condition was treated in hospital for two months, during which he had at intervals epistaxis, hæmaturia, and subconjunctival hæmorrhages. He was then discharged. Two years later he was readmitted unconscious after a blow on the head. Lumbar puncture yielded bloodstained fluid under pressure. He regained consciousness, but developed generalized purpura. During the next twelve months he had hæmorrhages from nose, kidneys, and bowels, and periodical cutaneous purpura. Some of the hæmorrhages were very severe. He was discharged after thirteen months in hospital, apparently much improved, having undergone a variety of treatment—iodoform emulsion, calcium lactate, horse-serum, coagulose,

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parental blood, and flavine intravenously.

He remained well for seven months and was then readmitted for epistaxis, which followed the appearance of cutaneous purpura three weeks previously. Similar hæmorrhages occurred at intervals, and he died four months later after a large hæmatemesis. The total duration of the illness was roughly six years.

Nephritis appears relatively frequently as a sequel of hæmaturia in purpura. Three cases occurred in the series under review, and in one of these it appears likely that free administration of oleum terebinth, given as a hæmostatic, was in part responsible for the development of severe nephritis which eventually proved fatal.

Carnot, in 1906,³ produced evidence of the relationship of purpura to tuberculosis, and suggested that purpura was a frequent antecedent of tuberculosis. It has not been possible to get evidence in support of this theory from the present series.

TREATMENT.

This is a matter of considerable difficulty. Drugs, however administered, have but a vague and transitory effect. The various sera tried did not greatly influence the course of the disease. Whole-blood transfusion, which has given excellent results in the hæmorrhages of the newly born, seems to offer the best hope, if not of cure, at any rate of alleviation.

I am indebted to the Honorary Physicians of the Queen's Hospital for Children, Hackney Road, for permission to make use of the records of this hospital.

REFERENCES.

- ¹ Ledingham : *Lancet*, 1914, pp. 1673; *ibid.*, 1915, p. 311.
- ² T. Watabiki : Kitasati Archives, November, 1917.
- ³ Carnot : *Lancet*, June, 1906.

Traumatic Rupture of Diaphragm, Patient lives over Two Years.

By HENRY DODGSON, M.B., CH.B.

*Cannock ; Police Surgeon and Public Vaccinator ; Medical Referee,
Local War Pensions Committee.*

ON April 25, 1921, I was asked by a representative of the local Coal Miners' Association, to make a post mortem examination on S. D., a coal miner, aged 57 years, who had died two days previously. A death certificate had been given by a colleague stating that death was due to pneumonia.

As the deceased man had sustained a very severe accident in a local pit, being severely crushed by a heavy fall of coal and debris on March 25, 1919, and had never been the same man since, his relatives and friends considered that his accident had had a contributory effect in the cause of his death. Hence I was asked to make a post mortem on April 26. I saw deceased man's medical attendant, told him of the facts, and asked him to be present. On reflecting the sternum with the costal cartilages attached, I was surprised to find half the stomach, a considerable portion of the transverse and descending colon, as well as several coils of small intestine, occupying the left pleural cavity, and lying anterior to the left lung. On further investigation, I found a large circular aperture, about 4 inches in diameter, in the centre of the left half of the diaphragm. There were very few adhesions between the stomach, which was blocking up the aperture, and the margins of the diaphragmatic rent. The left lung, which was lying posterior to coils of colon and small intestine, was very small, shrunken, and collapsed, and showed well-marked anthracosis. The right lung was in a condition of pneumonic consolidation. No other gross lesions were found at the autopsy.

After due consideration of the state of affairs found in the body, I came to the conclusion that deceased had ruptured his diaphragm at the accident he had sustained over two years before—March 25, 1919—and that therefore his accident was a contributory cause of death, in so far as it had rendered the left lung almost—if not quite—useless, so that when he contracted pneumonia he was deprived of the use of the left lung.

My opinion was corroborated by Dr. S. G. Billington, Pathologist to the Wolverhampton General Infirmary, to whose kindness and

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courtesy I am indebted, and also by Dr. L. Ball, Pathologist to the Queen's Hospital, Birmingham, the latter acting for the colliery owners.

The circumstances of the man's death were communicated to the coroner. An inquest was held, and a verdict in accordance with my evidence was returned. As a consequence of that verdict, the widow of deceased will get compensation from the colliery company.

With reference to the exact situation of the rupture, I may state that most diaphragmatic herniæ occur through a congenital opening or deficiency between the postero-lateral section of the diaphragm arising from the vertebral column and arcuate ligaments, and the antero-lateral arising from the ribs. The rupture in question was situated entirely in the antero-lateral left half of diaphragm, and must therefore have been entirely traumatic in origin.

The only instance of a man living any length of time after a ruptured diaphragm, which I have been able to find in text-books, is one reported by Devergie, and mentioned in an old edition of Taylor's *Medical Jurisprudence*, in which case the patient lived nine months; but the record does not state whether the man worked at all after the accident.

In this case, the man was taken straight to hospital from the scene of the accident, and, according to evidence, he lay in a very critical condition for at least a week. He remained in hospital for six months, and was then discharged. He attended hospital as an out-patient for a further period of three months.

In October, 1920, nineteen months after his accident, he resumed work, at a light job, involving no physical effort—that of attending to an electric motor used for haulage purposes. He had suffered from dyspnœa ever since his accident, and, when he restarted work, his wife went with him to the pit head, and met him there again at the end of his shift, to assist him in walking home, a distance of nearly two miles. He worked from October, 1920, until March 31, 1921, when the coal strike occurred. The case is surely almost unique, and only shows under what physical disabilities some people earn their daily bread.

A Case of Hæmaturia.

By J. HIRSCHMANN, B.A., M.B.

Indian Medical Officer (Umhlali), North Coast, Natal.

A YOUNG farmer, aged 26, tall, well built, and healthy in appearance, came to me on April 10, 1921, complaining of passing blood. I at once took a catheter specimen of his urine and, pending examination for bilhartzia, I put him on a bladder antiseptic. The examination was negative; but, nevertheless, I treated him for bilhartzia without success. He was growing anæmic, and complained of pain after micturation. I examined his urine in the usual way myself, and was struck by the large amount of effervescence which took place on introducing acetic acid into the urine after heating it. I tried an acid on the cold urine, and the large amount of gas which came off was surprising. I collected the gas in a test tube and found it turned lime water milky. There was evidently a large amount of calcium in the urine. On interrogating my patient, I found that about a week before the bleeding began, he had limed all his water supply. Water in this district being kept in tanks, lime is used as a purifier, and I found a large amount of calcium carbonate in his drinking water. He told me that he took a great amount of water in the day unboiled. I stopped the water he was drinking, making him use boiled only, and in a few days the bleeding stopped. This showed pretty conclusively that the calcium was responsible for the bleeding. As far as I was able to ascertain, the bleeding was only from the bladder; but, being of a highly excitable nature, he would not notice anything else except the one thing that was uppermost in his mind.

Practical Notes.

Treatment of Pyodermatitis.

Apart from its association with parasitic affections, the most frequently observed forms of pyodermatitis are:—1. Impetigo, sometimes with yellowish and greasy crusts, sometimes with bullæ, and sometimes with folliculitis; 2. Ecthyma, the real dermatosis of poverty, becoming sometimes ulcerous; 3. Folliculitis, perifolliculitis, boils and pustules; 4. Abscesses of the sudoriparous glands, specially attacking the arm-pit, relapsing in summer sometimes for several months.

Rare complications are lymphangitis, nephritis with œdema and hæmorrhages, and septicæmia. The prognosis is favourable. The duration can be shortened, and the local results without ugly scars can be obtained best, by following the treatment recommended by Desfarges, in which local applications and general treatment by internal antiseptics are used.

I. *Local treatment.*—The first indication is to remove the crusts, which hide and protect the infected surfaces, and beneath which the pyococci increase and multiply readily. There is no need to fear laying bare the irritated and discharging surfaces. On the other hand, full baths should be avoided because they promote the microbial growth. Occluding applications are similarly unsuitable. The possibility of nephritis should never be disregarded.

Spraying with hot boiled water, copious inunction of vaseline, and yeast poultices, which are very soothing, will soon bring about the removal of even the thickest and oldest scabs.

Moist applications soon loosen the crusts, but if in place too long, the epidermis becomes macerated and offers a fertile field for fresh inoculation and especially folliculitis.

Pustules should be opened with small scissors, and all dead skin pared away. The pus and all the contents are mopped carefully without rubbing, which will infect the surrounding parts. In sycosis, this preliminary cleansing is accompanied by epilation of the region affected.

A frequent fault in technique is to apply the remedies to a skin insufficiently cleaned and still covered with crusts; the best applications are rendered void of effect thereby, because no direct contact is possible.

The topical applications are most numerous. In spite of good results, the following should certainly be avoided altogether:—

Bathing with 4 per cent. formol, which is much too painful a procedure; Labarraque's fluid (even when diluted with twenty times its weight of water) and Dakin's fluid, both require very great care to avoid injury to the healthy epidermis; salol and menthol are much too irritating; nitrate of silver, in points or in solution, has attached to its use the risk of deep ulceration; per-

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manganate of potash soils linen badly, but a 4 per cent. solution is nevertheless indicated in the association of pyococci with *B. pyocyaneus*.

Desfarges chiefly recommends—

a. Championnière's powder, which is much better than iodoform ointments, pure or with camphor, or the ointment of Reclus:

Powdered grey cinchona,			
Powdered iodoform,			
Powdered benzoin,			
Carbonate of magnesia	-	-	of each 10 g.
Essence of eucalyptus	-	-	1.25 g.

b. Subcarbonate of iron is very successful as a paste (1 in 40) for ecthyma.

c. Glycerole of starch, to which is added one-tenth of boric acid is, according to Gallois, very effective in furunculosis.

d. Spraying with a 1 in 50 solution of resorcin.

e. Alibour's solution diluted with two or three parts. The irritation often produced by its use appears chiefly to be due to the sulphate of zinc, and Maceté advises the use of sulphate of copper alone in stronger concentration each day beginning with 1 per cent. After the application of the copper solution or Alibour's, the effect is completed by mercurial ointments, either yellow oxide or white precipitate, for which Gougerot recommends:—

Yellow oxide of mercury	-	-	1 to 2 g.
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Oxide of zinc,

Talc,

Oil of sweet almonds	-	-	of each 30 g.
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or

White precipitate	-	-	1 to 2 g.
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Tannin (in ether)	-	-	1 to 4 g.
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Talc,

Zinc oxide,

Oil of sweet almonds	-	-	of each 25 g.
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II. *General treatment*.—Good food, pure air, cleanliness of body and of clothing play a large part in this, and are of real use, which is by no means the case with purgatives, depuratives, and recuperative remedies, which may, in fact, aggravate the lesions.

Yeast, internally, vaccines, and serum treatment are not always effectual. Colloidal sulphur and colloidal tin are effective for boils.

Desfarges made particular trial of electrical colloidal manganese, and obtained conspicuous success not only in furunculosis, but in impetigo and ecthyma. It should be tried in all cases which do not yield to local treatment as well as in those in which, like sycosis, the application of ointments and dressings is most inconvenient. A dose, given intravenously, of 2 c.c. is well borne, and can be repeated every second day until a cure is obtained.

III. *Prophylaxis*.—After curing the disease, daily washing in warm water is useful with a soap composed of precipitated sulphur, 15 g.; vegetable tar, 10 g.; soft soap, 45 g. Afterwards, talc with 10 per cent. boric acid is applied—(*Journ. de Méd. et de Chir. prat.*, May 25, 1921.)

Reviews of Books.

On Diseases of the Lungs and Pleuræ, including Tuberculosis and Mediastinal Growths. By Sir R. DOUGLAS POWELL, Bt., K.C.V.O., M.D., F.R.C.P., and Sir P. HORTON-SMITH HARTLEY, K.C.V.O., M.A., M.D., F.R.C.P. Pp. 798. London: H. K. Lewis & Co., Ltd. 42s. net.

EXPERIENCE is everything in medical work, and, with two such authors as Sir R. Douglas Powell and Sir P. Horton-Smith Hartley, we open this book with no misgivings. Nor are we disappointed. Everything that is at present known about diseases of the lungs and pleuræ (including tuberculosis and mediastinal growths) is set out in most readable form. The book will rank as a classic in medicine in its new up-to-date form, and Sir R. Douglas Powell has been wise in relegating himself to the consulting branch of the subject and associating with himself Sir P. Horton-Smith Hartley, as joint-author, for what may be termed the practising branch. To show how up-to-date the book is, the newly added chapters are noteworthy on the subjects of gunshot wounds of the chest, chylothorax, massive collapse of the lung, sporotrichosis and artificial pneumothorax. Further, surgical methods have been more fully dealt with, as also has the bacteriology of the subject. The illustrations are particularly good, and the index is conciseness itself.

The Surgery of the Heart. By Sir CHARLES A. BALLANCE, K.C.B., C.B., M.V.O., M.S. 48 Figures. Demy 8vo. London: Macmillan & Co. 10s. 6d. net.

THIS book opens with an interesting review of records of injuries to the heart at the battle of Mantinea (B.C. 363), where wounds to the heart occurred from penetrating weapons, to injuries caused by modern firearms. In view of the renewal of the antivivisection craze and the great difficulty in getting "subjects," it is interesting to note how much cardiac surgery owes to experiments on dogs and the evolution of technique by operations on the cadaver. In page 25 we read: "For the present it is sufficient to affirm the obvious fact that without the successful experiment on the suture of a wound in a dog's heart a similar operation on the heart of man would never have been accomplished." The remarks on the surgery of the pericardium are specially valuable, bristling, as they do, with points of differential diagnosis and treatment. The lecture concludes with a tabulated record of 152 operations on the heart by the author and other surgeons. We have no hesitation in saying that the book should be in the hands of all operating

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surgeons and members of the R.A.M.C.

The value of the book would be enhanced by the inclusion of an index.

The Principles of Preventive Medicine. By R. TANNER HEWLETT, M.D., F.R.C.P., D.P.H., and A. T. NANKIVELL, M.D., D.P.H.
London : J. and A. Churchill. 21s. net.

DR. HEWLETT's reputation as a bacteriologist is world-wide, and chapters xiv and xviii, dealing with infection and infectious diseases and preventive inoculations, are worthy of his reputation as also are the various bacteriological references throughout the book. Preventive medicine is, however, by no means limited to bacteriology; consequently, Dr. Hewlett has wisely called to his assistance as co-author, a practical administrator, Dr. Nankivell, M.O.H., Borough of Poole. The joint authors are, therefore, responsible for the book as a whole, and must take joint blame for its hasty compilation, of which there is some evidence, and its *ex cathedra* statements. A second edition will be an opportunity for the authors to correct these shortcomings.

The substructure, upon which the book is written, is good, being Sir George Newman's synopsis, contained in his "Notes on Medical Education in England" (scope of preventive medicine for the medical student). The book, as a whole, forms a readable addition to the large number of books of a similar kind. Dealing with a similar subject, chapter xxi (Vital Statistics) is excellent. Medical students and general practitioners of medicine, for whom the book is avowedly written, will find it interesting reading, but, in no way a text-book for the former in preparing for the examinations for the D.P.H.

Diagnosis and Treatment of Brain Injuries. By WILLIAM SHARPE, M.D. Pp. 757, and 232 illustrations. Philadelphia and London : The J. B. Lippincott Co. 35s. net.

IN this work there will be found a very full account of the diagnosis and treatment of brain injuries with and without fracture of the skull. The author's remarks are emphasized by records of cases of which 195 are reported throughout the different sections of the subject. The illustrations are numerous and clear, and the book will be found useful both for the general information it gives and for reference by those who have to consider the possibilities of an operation in any particular case.

Feeble-mindedness in Children of School Age. By C. PAGET LAPAGE, M.D., M.R.C.P. Second edition. Pp. 309. London : Longmans, Green & Co. 10s. 6d. net.

THE second edition of this book presents the subject of feeble-mindedness in children of school age very fully. The necessity for lifelong care of such cases is emphasized if success is to be obtained in preventing criminal acts and the inheritance of imbecility in children. The various factors which take part in

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the causation of feeble-mindedness are discussed and illustrated by tables and diagrams. An appendix by Miss Dendy deals more particularly with the management of children of this kind and from it a great deal of practical information can be obtained with regard to physical and mental training. The book is well written, amply illustrated, and contains a very large amount of information which will be of assistance to every practitioner who has to deal from time to time with cases of the kind described.

Advice to Consumptives. By NOEL DEAN BARDSWELL, M.V.O., M.D., F.R.C.P. Pp. 153. London: A. and C. Black, Ltd. 3s. 6d. net.

ANY book that deals with advice to consumptives is welcome in proportion to the value of the advice given. It is conceivable that advice might be given that should never have been given, and that advice, that should be given, might be withheld. Dr. N. D. Bardswell is to be congratulated in having successfully steered clear of such a Scylla and Charybdis. The advice is good and easy to give, but may be difficult to carry out. There is, unfortunately, no alternative course, if a reasonable state of health is to be maintained by the consumptive, who is always liable to attack by the tubercle bacillus (which is ubiquitous), and whose cell-defences are already weakened by heredity, though it is still the fashion to regard consumption as not hereditary! The surgeon's knife is useless as also the physician's medicine. Arrestation of the disease depends upon the consumptive himself or herself.

Good food, fresh air, rest and suitable recreations are the simple and powerful remedies, which, if carried out intelligently, will make the consumptive's future hopeful and confident. Arrestation, if not cure of the disease is the reward. The other side of the picture (without the use of these remedies) is death. As usual, it is noticed that Dr. Bardswell concentrates on "after-care," and relegates sanatorium treatment to its proper place. The book is written simply, and should be placed in the hands of all consumptives, and those who have to look after consumptives. The first edition was published in June, 1910, and the present (second edition), though belated is welcome.

Anxiety Hysteria. By C. H. L. RIXON, M.D., M.R.C.S., and D. MATTHEW, M.C., M.B., CH.B. Pp. 124. London: H. K. Lewis & Co., Ltd. 4s. 6d. net.

THE authors give a good account of this form of psychoneurosis which has frequently been met with as a result of the war. While opinions may differ whether such a sharp line of demarkation can be drawn between the symptoms grouped under this heading and those classified under the names of other functional disturbances, the authors have given a clear account of the disease they set out to describe. The methods of treatment are discussed from a broad point of view, and the book will well repay perusal by those interested in the subject.

Preparations, Inventions, Etc.

APPARATUS FOR MAINTAINING ANÆSTHESIA BY OPEN ETHER DURING OPERATIONS ON THE THROAT.

(London : Messrs. Allen and Hanburys, Ltd.,
48, Wigmore Street, W. 1.)

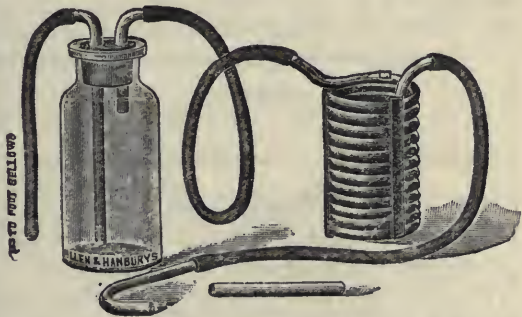
Dr. Harold Lington has devised an apparatus for this purpose, which consists of three main parts :—

1. A foot-bellows connected with
2. A Wolff's bottle containing ether, and then to
3. A coil of malleable metal, consisting of 12 rings, each nine inches in circumference, which is placed in a vessel of hot water.

The warmed ether vapour issuing from this coil is conveyed to a mouth-tube of flexible metal, six inches long, which can be bent to any desired curve.

The metal tubing and all the rubber tube connections are all of the same bore, one-quarter-of-an-inch, so that a full supply of warm ether vapour can enter the mouth and thus keep up the narcosis previously induced by the open method.

The use of the foot-bellows leaves the anæsthetist with both hands free. Oxygen may be used instead of air by connecting a cylinder of oxygen with the Wolff's bottle.



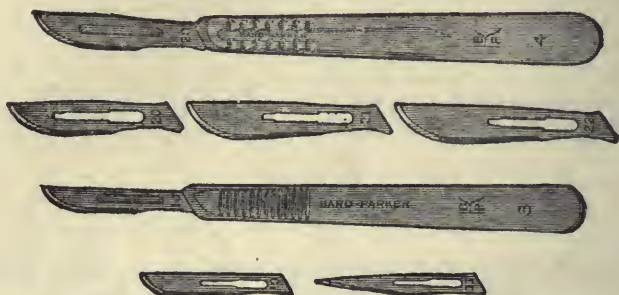
THE BARD-PARKER KNIFE.

(London : The Surgical Manufacturing Co., Ltd.,
83-85, Mortimer Street, W.1.)

This is a knife with detachable blades, and has been designed with the view of ensuring that with a supply of the blades at hand, a sharp scalpel with a keen edge is always ready for use. The attachment of the blade to the handle is perfectly simple and

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cannot get out of order, so that complete sterilization can be ensured. The troubles of sending scalpels for re-sharpening are

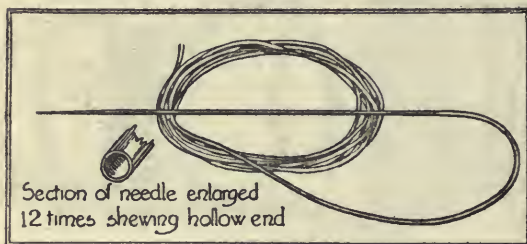


done away with. The blades are supplied in all sizes and in various shapes, in packages containing six.

NEEDLES AND CATGUT FOR OPERATIONS ON THE STOMACH.

(London : Messrs. Allen and Hanburys, Ltd.,
48, Wigmore Street, W. 1.)

Mr. H. J. Souttar, the Director of the Surgical Unit of the London Hospital, has invented a needle specially for use in operations on the stomach. It consists of the usual steel body and point, and can be shaped as any other needle, but instead of the eye, there is a small length of tubing fitted so exactly on to the steel body that hardly any trace of the joint can be detected by touch. The ligature is fastened inside the tube, and, being just the same size as the needle, no drag or pull is occasioned when it is used.



The needle has been designed specially for use with the Ultratan Catgut of the London Hospital, and is being manufactured by the firm of Charles Spencer, of Redditch, to take this catgut in all sizes. This firm has the sole manufacturing rights for the needle, which has been patented and the patent presented to the Hospital.

The needles are sent out in tubes containing two needles, each with a sterile suture attached, 27 inches in length. These are issued in boxes containing three tubes.

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OCTOBER

1921

The Pathways of Infection in the Rheumatic Group of Diseases.

By G. L. KERR PRINGLE, M.C., M.D., ETC.

Hon. Physician to the Royal Bath Hospital, Harrogate.

A FEW years ago we should, practically, have ridiculed the statement that all cases belonging to the rheumatic group were caused by some infective focus or foci within the body. Now, thanks to clinical study and bacteriological investigation, we are becoming alive to the fact.

There is still, however, a large body in the medical profession which, in spite of definite evidence, ignores the fact, and, in consequence, suffering is increased, whilst patients tend to pass more or less rapidly into a state of chronic invalidism, and cease to be in a position to earn their living. These cases are treated with salicylates, aspirin, iodide of potash, etc., kept in bed with their affected joints wrapped in wool, or told that they have

rheumatism and that little can be done for them. In course of time, when more or less crippled by ankylosed joints, the patient is sent to a spa to see what can be done, or because the medical man is at an end of his resources. The Royal Bath Hospital, Harrogate, is full of such wrecks, in which no attempt has been made to find the septic focus or "hidden sepsis." The physicians at the hospital have endeavoured to draw the practitioner's attention to oral sepsis by asking on the medical certificate for admission the question, Is there marked oral sepsis or dental caries? Yet, cases are continually being sent in with pus exuding from the alveolar margins, which must have been going on for months; if it had been recognized earlier, most probably the patient would have been saved much pain and crippling of joints.

Let us look at the chief pathways of infection, regarding which we have definite clinical and bacteriological evidence. The mouth, with the teeth, gums, and tonsils, is the great pathway by which sepsis enters into the system. When you have a patient, preferably a young adult, with an arthritis which came on insidiously in one or more joints, more especially affecting the periarticular tissues, and producing that fusiform appearance, not the variety of nodular swelling known as Heberden's nodes, then carefully examine the patient's mouth for signs of sepsis; there may be a tooth with an old sinus at the root which occasionally discharges pus, or there may be a thin red line along the alveolar margins, or the gums may be œdematous and flabby, or on examination pus may be found welling up from the root of a molar, or, again, there may be a crowned tooth which is tender on pressure. If in doubt, have the tooth X-rayed, for there is probably a granuloma at the apex of the root from which can be cultivated a pure streptococcus. If still in doubt, send the

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patient to a reliable dentist, and get him to remove all crowned devitalized teeth.

Now, I do not wish anyone for a moment to believe that, because a patient has a septic mouth, that he is bound to have one of the various manifestations of the rheumatic group; but, as long as he has a septic mouth, he is living on the edge of a volcano, and if at any time his resistance gets lowered, rheumatism in some form or other may begin. How frequently you get the history of a young woman, whose resistance has been lowered through a long and anxious period of nursing an aged parent, suddenly breaking down with an arthritis. Again, how common it is to find arthritis among dressmakers, typists, etc., whose resistance is lowered by insufficient and improper food, want of exercise, and working in a vitiated atmosphere; or a young mother whose resistance has been lowered by pregnancy or prolonged lactation. Over and over again, it has been found that the sepsis is not in the genito-urinary system, but in the mouth.

Now, I am not advocating that the patient should have all his or her teeth removed. Far from it, because no artificial teeth can be compared with the natural ones; but sepsis must be got rid of, and you must have confidence in your dentist that he will only remove what is absolutely necessary. In many cases extraction may not be required; removal of tartar, a mouth wash, and careful attention by brushing, etc., may be all that is needful. On the other hand, it may be absolutely necessary to extract all the teeth, and a word of warning is required here. Do not let the dentist remove all the teeth at one sitting, especially if there is active disease, for there is a big risk of flooding the patient with the poison and producing an exacerbation of the arthritic symptoms. It is much wiser to have one or two teeth extracted,

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a culture grown from the root-socket, a vaccine prepared, and the patient given two or three doses of the vaccine before the remainder are extracted.

If you are satisfied that the teeth and gums are beyond suspicion—and it is as well to have the dentist's opinion on this point—then carefully examine the tonsils and search for some history of sore throat. Pemberton, out of 400 cases of rheumatic disease occurring in men of the U.S. Army, found that, in 52 per cent., the tonsils were the seat of the infection; while Lillie and Lyons, working among the American civilian population, found as many as 81 per cent. occurring in patients under 30.

If one lets one's memory travel back over the cases of acute and subacute rheumatism which have come under one's care, in what a large percentage one can remember a history of tonsillitis, that the acute cases commenced with an attack of tonsillitis, or that they were subject to attacks of tonsillitis between their attacks of acute rheumatism, and that subacute attacks were ushered in by a mild tonsillitis. Also, in those patients who have never had an acute attack, how frequently was there a history of quinsy.

I do not wish to burden this paper with accounts of cases, but will just mention one which is typical of many others:—

Miss D., about 10 years ago, had a sharp attack of subacute rheumatism, a primary attack. She had a few septic teeth, which were removed, much against her will, and in 10 days she was free from her attack. In the spring of last year she came to me with a history of four months in bed with subacute rheumatism. Her ankle joints, wrists, and digital joints were swollen, and she could scarcely walk. She had been slightly febrile all the time. I elicited a history of an attack of quinsy the previous November. Her tonsils were removed under a general anæsthetic, and one contained a focus of greenish pus which, on culture, grew the streptococcus viridans, from which a vaccine was prepared by my colleague, Dr. Sinclair Miller. Her aches and pains had practically ceased before she had recovered from the tonsillectomy, and the vaccine was almost unnecessary. Since that date she has been absolutely free from all symptoms. I believe, in this case, that had the

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tonsils not been removed at once, the patient would now be a cripple.

The tonsil must be removed entirely; no portion must be allowed to remain. Be particularly suspicious about those semi-atrophied flat tonsils, and, when inspecting them, see that you get a good view of the whole tonsil. If you are at all in doubt, have the opinion of your throat colleague, and explain to him that you are looking for a septic focus. It is remarkable in how many cases you can worm out from the patients a history of sore throat. The earlier the tonsils are removed, the better the result—though, even in advanced cases, there is improvement and the pain is relieved.

There are still other pathways of infection which must not be neglected—the nose and accessory sinuses, especially the antrum, and also the middle ear. All should be carefully examined if the teeth and tonsils prove negative.

Then, again, there is the genito-urinary system. Pemberton, among the 400 cases in the American Army, found only 12 per cent. in which he could detect a septic focus. These were picked young men who had passed a severe medical examination before admission to the Army. The percentage among the civilian population must be higher, especially in late adult life in both sexes. A specimen of urine should be obtained (in female cases the catheter is necessary to avoid contamination; in males careful cleansing is sufficient) and investigated by a bacteriologist for *B. coli* or streptococci, and appropriate treatment, such as washing out the bladder, urotropin, vaccines, etc., tried. One must not overlook the possibility of infection from the gonococcus in both sexes. The question of salpingitis is a more formidable one, and in a case in which it is present, and the patient is becoming gradually worse and more crippled, I should

not hesitate to advise total removal.

Last of all, we are left with the intestinal canal as a source of infection. Here we are on more uncertain ground, and it is difficult to dogmatize about the exact part played by infections of the intestinal canal. The effects of stasis have been clearly demonstrated by Arbuthnot Lane and other surgeons, who, by short-circuiting, etc., have relieved stasis, and thus cured cases of arthritis. Colitis, and other catarrhal states of the large and small intestine, all show an abnormal condition of the intestinal mucous membrane, with the consequent absorption of toxic materials into the blood-stream. The correction of chronic constipation by suitable exercises, laxatives, or supporting belt where there is visero-ptosis, are useful measures. The cure of colitis by intestinal lavage and careful dieting, and even the removal of a chronic inflamed appendix or gall bladder, are all methods which in certain cases must be carefully considered. Where possible, careful chemical and bacteriological examinations of the stools and urine should be made in those cases in which intestinal toxæmia is suspected. The bacteriological findings in these cases may be classified in three groups, saccharo-butyric, indolic, and mixed. So far, attempts to change the character of the flora of the colon have not been very successful, and we are still in the dark about the correct methods to be employed. Drugs do not appear to be of benefit, and the hope is that solution may be found by appropriate dieting, depending on the bacteriological findings.

Once the septic focus is discovered and removed—and the sooner it is removed the better—then every attempt must be made to render the damaged joints as useful as possible. Baking, local peat baths, local steam baths, such as the Berthollet, paraffin wax, hot douching, sulphur immersion baths, etc., all have

their uses in particular cases. Reliance must not be placed on one or two methods of treatment, and there must be co-ordination of the many agents which have application. For instance, sole reliance must not be placed on vaccines, either stock or autogenous. They will not restore joints which have become stiffened. It is much more important to remove the septic focus, and then proceed, if necessary, with an autogenous vaccine, followed as considered best by some of the various external agencies enumerated above.

Probably in no class of case is so necessary competent direction of the various agents employed. It is no use ordering massage unless you give the masseur explicit directions about what he is and what he is not to do. You must not leave it to the masseur, unless you are absolutely certain that he knows what to do in a particular case and you rely on him doing nothing else. For instance, it would be unwise and harmful to allow some joints to be massaged. When you order massage in these cases, what you desire is, that the muscles involving the joint shall be massaged in order that the general nutrition of the limb shall be improved, and allow Nature and the patient to assist, by ordinary passive movements. Massage must not be employed to a joint when active inflammation is going on in it or the periarticular tissues. Massage is always more efficacious after hyperæmia has been induced either by baking with electric hot air, steam, or Bier's bandage; and the same remarks apply to ionization.

Then there is the difficult question of splinting. Many a joint has been hopelessly ruined by fixing it on a splint to keep it at rest. One would like to say that on no account should an arthritic joint ever be splinted, but there are occasions when a splint is necessary to prevent or correct deformity.

Then, it becomes at times necessary to call in the

assistance of the orthopædic surgeon when we are dealing with the various sequelæ of chronic arthritis. A timely tenotomy, or an arthroplastic operation, or the employment of brace or artificial muscle, will in certain cases hasten the return to normal or improve the usefulness of a joint.

To sum up: the treatment of cases of rheumatic disease, whether arthritis, rheumatoid arthritis, sub-acute, chronic or muscular rheumatism, consists of three points:—

1st. In attempts to discover and remove the septic focus or foci; and I would repeat that the sooner this is done the better for the patient and the better the result.

2nd. On external and local measures to restore the joints and limbs to as near the normal as possible, not forgetting the fact that dependence should not be confined to one or two such methods.

3rd. The patient's resistance must be built up by means of tonics, fresh air, and, possibly, vaccines. Many cases of arthritis are starved, whereas they should be built up by a generous diet. I am not including here the plethoric type of patient with a fibrositis or chronic villous arthritis, who, as a rule, requires to be carefully dieted and his appetite restricted. Encourage your patient to go out and take exercise. If possible, they should not be allowed to stay in bed. Keep them employed with some form of treatment; let them see you are doing something for them. They are all the better for some light form of employment.

Again, everything must be done to encourage the patient. The public have got hold of the term "rheumatoid arthritis," which they believe denotes an incurable disease; therefore, never use this loose term, which has caused so much depression and harm.

So far, little has been said as to the use of drugs.

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In the osteo-arthritic and fibrositis, iodine certainly does good, preferably in the form of collosol iodine or the French tincture, but it must be continued for months. Guaiacol I have, personally, found no benefit from.

Intestinal antiseptics, such as kerol, salol, creosote, etc., may do good in certain cases, but I am sceptical, and would prefer to lessen fermentation by means of Bulgarian milk or lactic oats.

Malt, cod liver oil and arsenic are probably much more useful by building up the patient. Nathan, of New York, advocates thymus gland in large doses. Locally, preparations of iodine with an ointment or oil basis are useful, especially in conjunction with hot air, leucodescent lamp, Berthollet steam baths, or other methods which produce hyperæmia.

Every now and then, one comes across a case in which, in spite of all methods of treatment, the condition gradually advances from one joint to another. In these cases, I believe that we have not found the causative factor, or have discovered one and there are still others.

It is well known that our poor-law infirmaries and incurable homes are full of the wrecks of rheumatic disease, many of which we now know could have been arrested, had the causative focus been removed.

I acknowledge the difficulties which must lie in the path of the general practitioner, financial and otherwise, in attempting to carry out the procedure as described above, and realize that, at any rate, with patients of the working class, those who come under the National Health Assurance, and those who cannot afford a lengthened investigation, it is better that they be sent to a hospital which makes a speciality of dealing with the rheumatic group of diseases, and where their case can be investigated and the necessary treatment in the way of baths, electricity, and massage is provided.

Empyema in Childhood.

By FREDERICK C. PYBUS, M.S., F.R.C.S.

Assistant Surgeon, Royal Victoria Infirmary ; late Surgeon, Hospital for Sick Children, Newcastle-on-Tyne.

EMPYEMA is such an important complication of chest infections that I make no apology for calling attention to it. Never a week passes without one being admitted or developing in hospital. Some are admitted early and in good condition, when a good prognosis can be given; others are gravely ill, and only after some weeks' duration, when there is a large collection of pus and a corresponding compression of the lung and degree of toxæmia. These cases have a great struggle for their lives, and the pneumococcus only too often proves the victor.

The remarks are based on an analysis of the first hundred consecutive cases operated on by me at the Hospital for Sick Children. Although succeeding series may show better results, the figures will serve their purpose. In this condition, as in many others, improvement in the mortality rate and diminution of the period of convalescence can be obtained only by the earlier diagnosis and consequent submission to surgical treatment.

Empyema in children is, in nearly all cases, a complication of pneumonia, the infection of the pleura being by direct extension of inflammation.

Whether a primary serous effusion, which later becomes purulent, often occurs, I am unable to say, but when fluid is discovered early, and is found to be turbid, it soon becomes purulent. Extension of the infection to the pleura from other parts is rare,

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but may occur after peritonitis. In young children it almost appears as if a direct blood-infection took place, for not infrequently, in pneumococcal infections, necropsy will show bilateral empyemata and pericarditis which have arisen almost simultaneously and must have been preceded by a septicæmia.

However, the common cause is pneumonia, either lobar or lobular, and, as one might suspect, the pneumococcus is by far the commonest infecting agent. The pneumonia may be primary or may follow one of the exanthemata.

The table shows the results of my series :—

Organisms :

1. Pneumococcus	-	-	-	-	40
2. Streptococcus	-	-	-	-	2
3. Staphylococcus	-	-	-	-	3
4. Sterile	-	-	-	-	1
5. Diplococcus (nature not stated)	-	-	-	-	5
6. Nos. 1 and 2	-	-	-	-	5
7. Nos. 2 and 3	-	-	-	-	1
8. Tubercle bacillus	-	-	-	-	2
					<hr/>
					59
Not noted	-	-	-	-	41
					<hr/>
					100

It will be seen that the pneumococcus is present in two out of every three cases examined.

The condition is commonest in the early years of life, and is most fatal in children under two years. At this period the pneumococcus seems especially deadly. Males are more commonly affected than females, the former being 61 and the latter 39 in number in the above series.

The morbid anatomy as shown at operation consists in a collection of pus generally thick in character, and containing large shreds of fibrin occupying a variable extent of the pleural cavity, the abscess being shut off by adhesions. The pleura is thickened and coated by lymph. The lung shows a variable degree of

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collapse depending on the size of the empyema. At necropsy the above condition is found. The lung on section shows lobar or lobular pneumonia in varying stages, and it is the amount of lung damage more than any other factor which often precludes these cases from recovery.

Bilateral empyema may be found associated with broncho-pneumonia, and, after this, suppuration in the pericardium or meninges often determines a fatal termination. In all cases decided toxic changes are found in the other organs.

By the time the surgeon sees a case of empyema, the condition is usually well developed, and the diagnosis is often made and confirmed by exploratory puncture. On inquiry, however, one finds the child recently to have had pneumonia, perhaps following one of the specific fevers. Occasionally the empyema may follow an abdominal lesion, while in other cases the patient has had an indefinite illness, accompanied by fever, and later is found to be wasting. The patient may be recommended to hospital as one of appendicitis or meningitis.

On examination, in the acute cases one finds fever, usually intermittent in type, and this alone, following pneumonia, suggests a collection of pus. Cough is usually present, while in the worse cases dyspnoea is pronounced. Both cheeks may be flushed, or only that on the affected side; but in the later stages the child may be dusky and cyanosed, with dilated pupils. It is usually restless and cries on being moved. The chest shows varying signs; the only one common to all cases is abnormal dullness. The heart may be displaced, being pushed towards the sound side. Breathing is unusually rapid, and in many cases the affected side of the chest is enlarged while its respiratory excursions are diminished. In large collections of pus the intercostal spaces may actually

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bulge; while, should the empyema reach the surface, it frequently does so near the apex on the front of the chest. Palpation will demonstrate, in some cases, that vocal or even respiratory fremitus is diminished, though in young children this is difficult to obtain. The most important sign is dullness, varying in degree and area with the amount of pus present. The increased resistance to percussion gives a tactile demonstration of this sign.

Contrary to what might be expected, in most cases bronchial breathing and moist sounds can be heard over this dull area, as well as in other parts of the affected lung. It is this unexpected sign which accounts for so many cases of empyema being overlooked, and until this is generally realized, there must be delay in recognition and operation.

When the stethoscope alone is relied on as a means of examination, then, altered breath and adventitious sounds being heard all over the lung, it is considered that no fluid or pus can be present.

In patients presenting a swinging temperature and dullness over the lung, following pneumonia, the diagnosis of empyema is nearly certain. To confirm this diagnosis, the exploring needle should be inserted and the nature of the fluid established. If pus is not obtained at the first puncture, a second, or, if necessary, a third, attempt should be made.

In the more chronic cases, fever may be absent if the pus is sufficiently enclosed so that no absorption is taking place. There may be definite bodily wasting, and the affected side of the chest may be smaller than its fellow. The heart may be drawn to the affected side, and the sound side of the chest expanded from compensatory emphysema of the lung. In these cases, when the pleura has become thickened, there may be considerable diminution of breath-sounds, approximating to the physical signs found in the

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adult. With a careful consideration of the history and the physical signs enumerated, the diagnosis of fluid at least is not usually difficult. A swinging temperature usually means pus, and in all cases of doubt an exploring needle should be used. The fluid so drawn off may give valuable information. Naked eye examination determines whether it is serous or purulent. Microscopical examination will show how far pus cells are present, and at least some opinion as to the number and varieties of organism can be formed. The material can also be cultured and the nature of the organisms definitely established. The mistakes which can be made in confounding empyema with other conditions are numerous; but, in most instances, they arise from imperfect examination rather than from lack of knowledge.

A child suffering from empyema may be thought to have some abdominal infection, and may even be submitted to laparotomy. In these cases abdominal pain, and perhaps restricted abdominal movements, may suggest a sub-diaphragmatic lesion; but, in all cases in which the abdominal signs are somewhat indefinite or deficient, careful thoracic examination should be carried out. Meningitis may be simulated. At least, I drained one empyema with a successful result, which was sent into hospital as suffering from meningitis. In the more chronic forms, an overlooked empyema may cause the patient to be labelled as one of phthisis, and the similarity, both local and general, is quite notable.

When pus has been found in the chest, it should be evacuated at the earliest opportunity. If the fluid on examination is turbid, aspiration may be tried, but frequently fails to cure, for this turbid fluid rapidly becomes purulent. Aspiration for empyema is only advisable if the patient is too ill to stand incision of the chest wall, or when the condition is bilateral, as

was the case in two of my series.

Apart from this, incision and drainage is the best form of treatment. The empyema must be opened wherever it is situated, but the majority can be opened at the optimum position—about the seventh or eighth interspace in the mid-axillary line. It will be found that drainage occurs most satisfactorily in this position.

To carry out the operation the child is suitably clothed—being wrapped in wool if necessary. It should lie comfortably on the sound side, with the uppermost arm held forwards out of the way. The question of the anæsthetic is an important one. After losing one or two patients, after comparatively trivial operations, from delayed chloroform poisoning, this latter drug was almost abolished from use. It seemed additionally dangerous to those in a condition of profound toxæmia, and I believe it will account for a number of deaths following operation for empyema ascribed to other causes. Its use should at least be avoided if acetone is present in the urine. Ether, while safer, is irritating, and must be additionally so to the lung already inflamed. In most of my cases, infiltration with novocaine was used and proved satisfactory — the number, unfortunately, is not specified. The local anæsthetic has a further advantage, for while less toxic and irritating than the general, it allows a child to be fed up to and, if necessary, during the operation, which helps to keep the child's mind occupied, and immediately after, so that no starvation need result.

The collection may be opened and drained through a simple incision made through the intercostal space, but in 75 per cent. of my cases, resection of rib was practised. This adds very little danger to the operation, and allows a larger tube to be introduced, which facilitates the evacuation and discharge of the usual fibrinous material. To carry out this operation, an

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incision is made over and parallel to the eighth rib. The rib is exposed and the periosteum stripped from it. A segment of rib 1 or $1\frac{1}{2}$ inches is removed. The pleura is then incised and the tube inserted, so that its extremity projects a short distance into the pleural cavity. The tube is sutured to the skin, and later, when this suture is removed, a safety-pin is passed through the outer part of the tube to prevent it falling into the chest. The wound is dressed in the usual way.

The fever usually disappears in 24 hours, unless the lung condition causes its continuance. Recurrence of fever may be due to the development of an empyema on the opposite side or to some other infection such as pericarditis, and these must be kept in mind. Careless attention of the wound may permit a mixed infection to occur with increase in the discharge and further fever.

As the discharge diminishes in amount, the tube must be removed, but the average duration of the discharge amounts to at least four to six weeks. The opening has a tendency to close, and the tube may require re-insertion for a further period. Expansion of the lung should be encouraged by blowing exercises, if the fever has been absent some days and other conditions are satisfactory.

Prolonged suppuration is due, most frequently, to the cavity remaining unobliterated, owing to the thickened pleura preventing the lung expansion. The extent of this cavity can be determined by probing or by injection of bismuth paste and X-ray examination. If it shows no sign of diminishing in three months, a further resection of ribs should be considered. Seven per cent. of my series required secondary operations for the establishment of further drainage, and two required thoracoplasty.

Prolonged discharge may also be due to a mixed

infection, caries of the rib, or to the retention of a drainage tube or gauze, if attempts have been made in the pernicious practice of packing the wound.

More recently, I have, in a few cases, opened the empyema more widely, evacuated all contents and washed out the cavity thoroughly with flavine solution, and almost entirely closed the wound. It is too early to speak dogmatically of the results, but on the whole they show an improvement, and any measure which lessens the length of time necessary for drainage will be of great advantage. At the same time early operation and healing prevents any sinking in of the affected side of the chest and consequent asymmetry. After a thoracoplasty, pronounced deformity may result, not only of the chest but also of the spine, giving rise to definite scoliosis.

Empyema must always be considered a serious condition, especially in young children. It must be remembered that it is itself a complication of a disease of no little severity. The mortality of the above series was 24 per cent., but many of these cases were very gravely ill at the time of operation, and died from general infections which we have at present no means of combating. The improvement of results lies in earlier recognition and operation, or the discovery of some specific remedy. The pneumococcal cases, on the whole, do best; those in which the pus is thin and stinking fare worst. In these cases the streptococcus has been found, and although the pus seemed to have a faecal odour, no mention of the bacillus coli is made in the bacteriological reports, so that one may deem that it was absent.

The Uses of Diathermy in Dermatology.

By W. KNOWSLEY SIBLEY, M.A., M.D., B.C., M.R.C.P.

*Physician and Hon. Electro-Therapist, St. John's Hospital
for Diseases of the Skin.*

DIATHERMY is an electrical method for the production of an increased local temperature, or hyperæmia, of the part of the body to which the current is applied. For practical purposes, diathermy may be administered in two forms: one may be described as medical diathermy, and the other as surgical diathermy or fulguration. The former is the heating up of parts of the body which are the seat of disease to a temperature not high enough to destroy the tissues or to impair their vitality.

The therapeutic value of local heat applied to the surface of the body has been generally recognized from time immemorial. This form of treatment produces an hyperæmia which is a state of active or passive congestion, that is a condition of increased blood supply to the part, the result of a dilatation of all the vascular channels, arterial, venous and capillary, followed by an augmented removal of deleterious bodies by the dilated veins. In other words, hyperæmia signifies an increased metabolism of the tissues.

From a dermatological point of view, it is the surgical diathermy which I have especially used for the purpose of cauterizing areas of the skin and surrounding tissues to which the electrode is applied.

I have now treated a large number of skin cases

both by medical diathermy and by surgical fulguration. The former have chiefly been chronic ulcers of the leg, both varicose and syphilitic, erythemata, such as erythema nodosum, and various chronic dermatoses of the lower region of the legs and ankles, the result of old-standing stasis; also lesions due to circulatory defects (chilblain circulation), Pernio, Raynaud's disease, etc.

In these cases the method usually adopted has been to place the hand or foot in a basin of warm saline solution, with one electrode placed in this and the other applied over layers of lint soaked in saline solution and firmly bandaged to the limb above the seat of the lesion. The current is gradually turned on and increased as long as the patient does not complain of discomfort, when it should be immediately diminished. This application lasts for 15 to 20 minutes a treatment, and may be repeated daily or less frequently according to circumstances. After each treatment the parts should be appropriately massaged and then well wrapped up and kept warm as long as possible.

This system also applies to the treatment of gonorrhœa, both of the male urethra and female cervix, in which cases a zinc sound is inserted into the passages and attached to the diathermy apparatus; the current is then very gently turned on, and gradually increased until the patient complains of discomfort. Gonococci are easily destroyed by heat, for a temperature of about 103° F. renders them inert.

With regard to surgical diathermy or fulguration, to all intents and purposes this is a process of cauterization, but really one which is much less painful than the actual cautery. I have treated nearly all my cases without an anæsthetic, either local or general. A local anæsthetic is never very

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satisfactory, because it is difficult to do away with the shock from the electric current, which when producing a spark is as disturbing to the patient as the actual burning process.

Two sets of active electrodes are in use, one being of blunt-pointed steel, and the other flat steel discs of various sizes. For complete cauterization the pointed one is in general use, such as in cases of lupus vulgaris, rodent ulcer, nævus, etc., and for partial, when only a smart reaction of the tissues is required, as in lupus erythematosus, one of the flat electrodes has been applied.

For the purpose of the production of cauterization the inert electrode is placed over the chest or abdomen, and consists of a large metallic plate covered with several layers of lint soaked in normal saline solution, or the patient grasps firmly with both hands a double handle electrode which is attached to one pole of the apparatus, the other pole being attached to the active electrode which is held by the operator. This method is far more convenient and rapid of application, than that in which the inactive electrode is attached or bound to some part of the patient, which usually means partly undressing and then bandaging on the electrode. The active electrode is usually made in the form of a needle, spatula, or button, the handle of which is carefully insulated, and the operator, unless the electrode is earthed, should wear thick rubber gloves. Owing to the resistance offered to the passing of the electrical current, so much heat is produced as to coagulate the albumen present in the tissues, and this condition extends for some distance beyond the area of the application of the electrode. It is thus far more penetrating in its effects than when an ordinary cautery is employed, or where the destruction of tissue is more or less limited to the

actual area of application.

In the case of infants and small children who are too young to be relied upon to grasp and firmly hold the handle electrode, it is of course always necessary to bind the inactive electrode firmly to one of the limbs, taking care that the lint under the metal electrode is evenly wet and saturated with the saline solution.

The electrode is applied to the skin, the current is then gradually turned on, and should be turned off before the electrode is removed to prevent sparking, which adds to the patient's discomfort. Soon after the current is turned on a bleaching of the tissues takes place, followed by fine bubbles which appear over the area, soon leading to a blebbing and destruction of the epidermis which peels off. By another method, the active electrode may be earthed and then held in contact with or a short distance from the lesion, and so cauterizing by sparking the area; this method is distinctly less painful, and does not, usually speaking, necessitate an anæsthetic being given.

With this system one pole is attached to the handle held by the patient and the other to the couch on which he is lying. This process is one of cauterization or destruction of a lesion applied from within the tissues, the current being drawn through the patient to the electrode which is held in the operator's hand.

The advantages generally claimed for this form of cauterization over operations by the surgeon's knife are as follows:—

(1) Bloodlessness. When the electrode is properly selected, neither too sharp nor too pointed, extensive operations may be performed without appreciable immediate hæmorrhage. Secondary hæmorrhage may occur later on, when the slough begins to

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separate, and must be carefully watched for in all extensive cases, or those in especially vascular areas.

(2) If the operation is satisfactorily performed, all the tissues in the immediate neighbourhood of the seat of the electrode are completely destroyed, and so prevent the possibility of secondary growth by cell-implantation; there is, moreover, no risk of spreading the disease by the instrument of operation.

(3) Sterilization of the Operation Area.—The process of destruction is so complete that all pathogenic organisms which come in contact with the instrument will be destroyed effectively.

(4) Destruction of tissues can be produced at some appreciable distance from the active electrode. The extent of the area of destruction depends upon the form and size of the electrode, the strength and duration of the current, and the nature of the tissues.

(5) The shock is considerably less than after other surgical procedures.

(6) There is a complete coagulation of all vascular structures, including the lymphatics in the neighbourhood, and so septic absorption is much less likely to take place.

(7) The operation being more or less bloodless, it is much easier for the surgeon to see what he is doing.

(8) The scar resulting from the operation is usually denser and firmer than after cutting operation, and thus acts as a barrier to the extension of malignant growths.

(9) It is often possible to operate on subjects considered too old or feeble for other methods, the electric current acting as a stimulant to the patient.

(10) If necessary, operations may be performed at several sittings and, in the event of recurrence of the growth, further applications may easily be made.

It is needless to point out the unlimited range

which diathermy opens up for dermatology. It may be considered the most satisfactory method for the destruction by a process of cauterization of large numbers of more or less superficial skin lesions, especially such as various forms of rodent ulcers, nævi, lupus vulgaris, warts, etc., together with a large number of small ill-defined lesions in the skin, for which actual superficial destruction of the epidermis or deeper tissues may be necessary.

I have so far treated with fulguration cases of the following skin lesions, with satisfactory results, acne, cicatrix, epithelioma, ganglion, Kaposi's disease (multiple hæmorrhagic sarcoma), keloid, lichen planus and hypertrophica, lichenification, lupus erythematosus and vulgaris, nævi, single and multiple and linear, pruritus, rodent ulcer, sarcoma, sclerodermia, verrucæ. I will briefly describe a few of these.

LUPUS.

I have treated some thirty cases of old-standing lupus vulgaris, many of them of from ten to forty years' duration, and most with lesions about the face especially, in fact, in 75 per cent. the disease was limited to this region. Practically, all the patients had been under treatment of various kinds for many years, but still the disease showed signs of the slow extension usual with this malady.

In a number of cases, especially when there was only one patch of lupus, the central regions were partly healed and consisted of firm scar tissue, but there were still active granulomatous nodules scattered about the periphery, and it was chiefly to these regions that the treatments were directed. With a blunt-pointed electrode each granuloma could be touched and so destroyed. When, on the other hand, there was a general infiltration but no individual granuloma the pointed electrode was slowly

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but firmly passed over the edges of the disease. At the same sitting, if there were any isolated granulomata visible in the central areas, these were also picked out. The same method was likewise applied to cases in which the disease had extended slightly into the nostrils, and even in some old-standing cases in which the septum had been eaten away.

In a few cases there were multiple lupus patches, situated in various regions of the body, sometimes as many as twelve or more separate areas of the disease, especially common over the region of the joints, elbows, and knees.

In all of the old-standing cases the treatments were repeated about once a week or once a fortnight.

W. R., a man of 44 years of age, had had lupus of the right side of the face for some 40 years. When he was two years old, he broke an iron fork in his right cheek. The place apparently healed up and broke out again when he was five, and has continued ever since. As a child, the patch was cauterized; 24 years ago it was scraped in University College Hospital. Eighteen years ago he had Finsen light treatment at the London Hospital for $3\frac{1}{2}$ years. Some six years ago he had injections of bacillary emulsion for three years, at St. John's Hospital for Diseases of the Skin. Then, later, he had seven injections of Novarsenobillon from February to March, 1920.

The patient came under my care in May, 1920, when he presented a large patch of irregular scarring covering the whole of the right side of the face with isolated tubercular granulomata scattered about and a decidedly active granulomatous raised margin all round. There was not any ulceration present. I began fulguration with the blunt-pointed electrode, both to the individual tubercles scattered over the area and to the raised margin, treating about one-third of the edge at each sitting. He has now had some 10 treatments; the condition of the lesion, as shown by a photograph, is much improved, and the whole disease is at present quite quiescent.

A woman, L. J., single, now aged 37, came under my care first in November, 1910, with a fungating lupus of the tip of the nose, when she was treated with X-rays on and off until October, 1912, when the condition had quite healed up. Her nose remained well until November, 1919, when she returned with a slight recurrence and was again treated with X-rays, with some improvement; but the condition was not quite healed, so from March, 1920, to June, 1921, I have treated her with fulguration with satisfactory results,

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she having received about ten treatments.

LUPUS ERYTHEMATOSUS.

E. S., a woman, 44 years of age, for four years has had a patch of lupus erythematosus on the left side of the face. The patch was red and very irritable.

From December, 1919, to April 20, 1921, she was treated by half-pastille doses of X-rays, filtered, having seven sittings in all. After this she had some zinc ionizations, and all without much improvement; in fact, the patch had certainly extended and continued very irritable.

I applied fulguration with the flat electrode on February 26, 1921, and she has had three similar treatments since; the lesion is now paler and much more comfortable, the irritation having subsided.

MULTIPLE HÆMORRHAGIC SARCOMA (KAPOSI).

H. W. M., a fairly healthy, well-preserved man, aged 72 years, had a large number of tumours of various shapes and sizes scattered over his body. They first started after an injury to the dorsum of his right hand eight years ago. Some 18 months later a similar lesion appeared on the left hand, and afterwards the feet and ankles became affected, and the condition of tumour formation gradually spread upwards, the face, head, and neck being the last to show any tumours. He now presented a large number of tumours scattered over various parts of his body. Most of the tumours were deeply pigmented, and varied in size from a pea to some three or four centimetres in diameter.

A section of one of the growths showed it to be of a hæmorrhagic, granulo-fibromatous nature.

Some of the tumours were treated with half-pastille doses of X-rays, and improved considerably; to others I applied the blunt-pointed fulguration electrode, especially to some of the large tumours on the shoulders and face. The result of each treatment was a central eschar, which separated in a week or two and left a flat pigmented scar, with sometimes some tumour formation still present at the periphery of the lesions, where the tissue had escaped the action of cauterization. The results were eminently satisfactory, and in no case was there evidence of recurrence in any of the tumours treated.

NÆVUS.

I have treated some fifteen cases of nævus with fulguration, always using the blunt pointed electrode, and will describe one or two:—

E. L. B., an infant of 11 weeks, had a small, round, prominent nævus at the base of the nose, slightly to the left side, as shown in a photograph taken on February 1, 1921, when I applied fulguration on one occasion. On March 9, a second photograph was taken,

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showing the complete destruction of the birthmark.

G. B., a girl, aged 14, had several round, deeply-pigmented nævi scattered especially about the right cheek, as shown in a photograph taken on May 20, 1920. She had two or three of these treated at a sitting, and after four separate treatments the birth-marks had been completely removed, as shown in a photograph taken in April, 1921.

PRURITUS VULVÆ.

K. B., a married woman, 32 years of age, has for 10 years suffered from severe pruritus vulvæ, which prevented sleep at night and made her life almost unbearable. She has been more or less continuously under treatment with lotions, ointments, powders etc., without benefit.

In October, 1919, I took her into hospital and gave her high frequency daily, and ionization with zinc every two or three days, with very little improvement. She then had four doses of X-ray treatments, followed by zinc ionization, but the condition continued very troublesome.

In March, 1921, there was some slight thickening and lichenification of parts of the external labia majora, so I applied fulguration both with the pointed and also with the flat electrode. Some soreness of the parts followed, and the irritation became much less. The treatments were repeated every seven or fourteen days, and the improvement, which was noticed after the first treatment, continued.

RODENT ULCER.

I have treated eight cases of this disease with fulguration; most of them were of some years' duration, and had resisted X-ray and other recognized treatments.

F. T., a man 50 years of age, has had for seven years a rodent ulcer on the left side of his nose, now extending to the lower eyelid.

He had been treated with full doses of X-rays and with zinc ionization for nearly two years, with unsatisfactory results; the ulceration continued to extend, both superficially and in depth, and had now extended to the periosteum and bone, was firmly adherent to the deep tissues. He has now had some 24 treatments by fulguration; the disease has not extended, but is certainly not cured. It still bleeds very readily.

J. R., a man 45 years of age, had had an ulcer on the left cheek for 10 years. A biopsy showed it to be a rodent ulcer. He received a double pastille dose of X-rays on October 2, 1919. The treatments were repeated on October 30, and again in November and December of that year, and in January, February, and April, 1920, but the lesion never cleared up satisfactorily. On September 27, I applied fulguration, and again in February and April, 1921. A photograph

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taken at the end of May showed the condition to be quite healed.

Summary.—Fulguration as a means of cauterization in many dermatological conditions, is a very useful and convenient method. It is an aseptic and rapid treatment, for only a few seconds' application is necessary for most superficial lesions, and a large number of patients can be treated in a very short space of time. With the exception of those cases of rodent ulcer and lupus which were septic before operation, in no case did any sepsis arise as the result of treatment. I have found this method useful for puncturing acne pustules, as well as for opening small boils and abscesses.

The discomfort or pain during the few seconds of application could be easily borne, even by nervous or delicate subjects, many of whom were children, and pain was never experienced afterwards; the moment the operation was completed, all discomfort ceased spontaneously. The lesions rapidly dried up without any secondary inflammation, and, with the exception of those with previous ulceration, no dressings were necessary. The infirm or debilitated were also treated without any evidence of shock, either immediate or remote; in fact, the electric current appeared to act as a stimulant rather than a depressant. Lesions in epileptics were among those operated on, but a fit was never experienced as the result of the treatment.

I have, however, noted one or two cases of scar of rather a keloidal nature resulting from the treatment in cases of nævi, but whether this has been accidental or otherwise, I am not at present prepared to offer a definite opinion.

Uterine Hæmorrhage and its Treatment by the Galvanic Current.

By AGNES SAVILL, M.A., M.D., M.R.C.P.

*Physician, London Skin Hospital and to Skin Department
South London Hospital for Women.*

THE method of action of the galvanic current in gynæcological work is little understood. Much of the beneficial result obtained in uterine ionization is, I believe, due to the action of the current on unstriated muscle. In spite of the fact that the late Dr. Sloan, of Glasgow, the pioneer of the subject in Britain, published papers on this branch of electrical work as long ago as 1906, this method of treatment is still but little practised here. Much of the unpopularity of the treatment is due to the fact that those who know how to apply the electrical methods are not sufficiently trained in gynæcology to be certain of their diagnosis, or to be adept at the manipulation of instruments required for intra-uterine therapy. There is often difficulty in discovering the exact cause of a symptom, and hence in deciding the best and most rapid method of treatment. For example, I have known a chronic discharge treated by ionization of the cervix, when the true source of the trouble lay in the vaginal mucous membrane. On the other hand, those who are adepts in gynæcological work are naturally more conversant with other methods of treatment than electrical, and hence consider surgery as less laborious. It was the failures of surgery which led Dr. Sloan to perfect

his gynæcological work by the introduction of electrical methods. In France, gynæcological electrotherapy has been well known for over 20 years, but Dr. Sloan's work was entirely independent, inasmuch as he did not read French.

Zimmern's work *Hémorrhagies Utérines; Indications et contreindications de leur traitement électrique*, was published in 1901. It has 248 pages, closely printed, in which the subject of uterine hæmorrhage is studied from the point of view of treatment by galvanic and faradic currents, and details of cases are recorded very fully. Experiments on rabbits were made with curettage and with electrical applications, with subsequent microscopic examination of the uterine tissue, which showed the different local effects of these two methods of treatment. The conclusions he formed at that date are not in entire accordance with those of to-day, but the main theme, the curative results obtained by the galvanic current and the methods of procedure, is the same to-day as at the date of publication 20 years ago. Text-books of medical electricity, written by Bordier and Larat about the same time, show that the details of technique of electricity in gynæcological work were then well known, or at least widely enough accepted to be described in such text-books. Guilleminot's book on medical electricity was translated into English in 1906; it also contains a section on electrotherapy in gynæcology.

Cases of gonorrhœcal and other infections of the cervix which I cured by copper and zinc ionization carried out after Dr. Sloan's methods, were published in THE PRACTITIONER, 1914. So many electrotherapeutic workers have cured similar cases of long-standing discharge of the vagina, cervix, and body of the uterus, that it is only necessary now to mention them when passing on to the less well-recognized

electrical treatment of uterine hæmorrhage. I have had several cases since the war which lead me to believe that the good results obtained are not due solely to the fact of electrolytic action on diseased membrane and local medication by zinc or copper ions. It would appear that the galvanic current has an effect on the uterine muscle itself. That the galvanic current has a refreshing, tonic, and calming effect when applied in small doses for a short time, and a tiring, irritating effect when given in too large doses for too long a time, I have observed in cases of very varying types, such as, for example, cases of so-called cerebral and spinal neurasthenia, and cases of atonic dyspepsia with dilated stomach without nervous symptoms. Wherever there is fatigue of nerve, brain, and voluntary and involuntary muscle, small doses of the galvanic current appear to give fresh life.

On looking up authorities to discover what they consider to be the action of the galvanic current on the various tissues of the body, we find little definite knowledge. J. Larat writes in his *Traité Pratique d'Électricité Médicale*, third edition, that unstripped muscle reacts to galvanic excitation with a slow contraction, more decided at the positive pole, and lasting all the time of the passage of the current. He quotes Delherm and Laquerrière, who studied the effect on the small intestine of animals. He states definitely that the uterine muscle is excited to contract by the passage of this current. Zimmern attributes the greater part of the benefit obtained in hæmorrhage to the effect of the current on the muscle. Hence, indeed, he goes so far as to say that he believes the galvanic current is most efficacious in cases in which there is definite deficiency of the muscle-tone, as, for example, in subinvolution, congestion, recent endometritis, and certain fibroids. When the muscle is definitely inexcitable, he adds, as in advanced

sclerosis, he does not anticipate such good results with intra-uterine electricity.

Technique.—Zimmern writes that one must recognize that the electrical treatment of endometritis demands rather special technique. He considers it is important not to employ too high a dosage, just sufficient to cauterize superficially and enable the deeper layers to throw out fresh cells; high doses are destructive. By high doses he means 100 to 125 m.a.; for endometritis he recommends doses of 50 to 70 m.a. given for five minutes. The electrodes consist of various metals; zinc, copper, and platinum. The platinum electrode is the one chiefly employed by Zimmern. As this is not easily oxidized, and does not adhere to the mucous membrane, a higher milliampereage can be used with it than with a copper electrode. Zimmern points out that when the uterine cavity is large the usual platinum sound is of too fine a calibre. Asepsis and patience are required when introducing electrode into the uterus. It is by no means always easy on account of the flexions of the organ and the irregularities of the canal. Spasm or sudden pain may be elicited during the attempt. Sometimes, indeed, it is impossible to reach the fundus. All these difficulties I have encountered. Moreover, the introduction of the intra-uterine electrode through the glass speculum which protects the vaginal wall is often an exceedingly difficult operation. With a non-curved electrode, one succeeds more easily in certain cases; in others, it is necessary to withdraw the speculum, and slip over the metal electrode a non-conducting gum elastic sheath.

The usual method of procedure is as follows:—The intra-uterine electrode is attached to the positive pole of the battery. When a copper electrode is used, the action appears to be more powerful locally. The copper ions form an albuminate of copper, and

if 20 m.a. are passed for 20 minutes, the electrode becomes firmly adherent to the mucous membrane. The current must then be gently diminished to zero, the reverser changed, so that the intra-uterine electrode is attached to the negative pole, and the current then gently pushed up again to 10 m.a. Sometimes as long as 10 minutes will pass before the electrode is rendered sufficiently loose for removal. If an external wound is similarly treated, the whole surface is seen to have become covered with an opaque thickened blue layer of copper albuminate, extending somewhat beyond the area of contact of the metal electrode. If an erosion of the cervix is present, the same appearance is noted at the end of a sitting.

With intra-uterine treatment a glass speculum is used, filled with 2 per cent. copper solution, and some of this fluid, passing along the grooved electrode, reaches the interior of the womb; in this way is ensured the penetration of the copper ions into the entire surface of the uterine lining membrane. This method is necessary when there is evidence of infection, as revealed by discharge. It is probable that when there is a prolonged history of uterine hæmorrhage, even when there is no discharge some degree of infection of the organ is present. However this may be, the use of copper ionization has not been injurious in any of the cases treated. Intra-uterine copper ionization is followed by a heavy discharge, which starts usually the day after the application, and may last two or three days. The lining membrane is shed, and leaves a healthier layer beneath. If the application is continued twice a week for about eight times, a long-standing uterine discharge is usually cured; for long-standing hæmorrhage, 10 to 15 applications may be required. In certain cases one meets with difficulties; especially is this true when as an electrotherapeutist one has

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not had extensive gynæcological experience.

As the treatment continues the womb contracts, and there is more difficulty in persuading the electrode to enter. In cases of hæmorrhage it is then advisable to use the platinum sound, and good results can be obtained even when the fundus is not reached. In this case the local effect of ionization of the mucous membrane is not so essential a part of the treatment. The tonic effect of the passage of the galvanic current through the unstriated muscle is efficacious in bringing about a healthier condition. How otherwise can we explain the steady contraction of the organ, the healthier, firmer feeling of the walls, the *disappearance of the dysmenorrhœa*, as the course of applications of the galvanic current is continued? Another difficulty, not always realized, is that in some cases the discharge continues in slight degree after a course of treatment has been followed, when the size of the womb has become normal, and the periods have been restored to regular and painless functioning. This will usually be found to be due to a wide cervical canal, so wide that the electrode cannot come into contact with its entire surface. In such cases, a few more applications are made and good contact is ensured by wrapping the electrode round with wool soaked in 2 per cent. copper or zinc sulphate. The wool must be just thick enough to ensure contact.

The following cases of uterine hæmorrhage of widely varying types show that the action of the current on the uterine muscle played an important part:—

1. A young single woman, aged 23, whose periods had been irregular since the age of 14. As a rule, whenever her periods started, bleeding would continue for weeks or months, so that she had to be confined to bed for a great part of each year. In 1915, she was curetted; in 1917 the womb was "cauterized," and in 1919 curetting had again to be performed. After each operation she went several months without periods, once, in fact for six months. Whenever a period began, the history of continued bleeding recommenced. She was brought to me

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at the end of September, 1919, in a state of great weakness, after seven weeks of continuous bleeding. She had tried every known drug and endocrine preparation in vain. The question of hysterectomy was being considered, and she was brought to me rather as a last resort in the hope that electricity might do something, before it was decided to perform so radical an operation on so young a girl. A blood examination showed that the coagulation was normal, that the anæmia present was of the type usual after much hæmorrhage, also there were indications that some septic focus was present. This was probably in the uterus itself, though there was no discharge beyond a slight mucous oozing. Copper cataphoresis, 20 m.a. for 20 minutes, was started, and given on the following days:—September 30, October 2, 4, 7, 11, 14, 17, 19, 23, 25, and November 2, 1919. When the treatment started the womb was very much enlarged, the sound passing up 4 inches, and felt soft as a sponge. The os was large, patulous, blue; one feared that the sound might penetrate the wall. Hæmorrhage continued until October 14. By the eighth treatment, the womb had shrunk to a normal size, and thereafter there was great difficulty in manipulating the sound so that it could enter beyond the cervical canal. I saw the patient a year and a half afterwards, strong and well, and she told me that ever since the course of electrical treatment, she had had perfectly regular and normal periods.

2. A married woman, aged 34, who in her girlhood had had scanty periods. After the birth of a child in 1908, the periods had always been profuse and had lasted too long. After the second child was born in 1912, she had three miscarriages, and hæmorrhage became progressively worse until she had a flooding every twelve days for the last two years before I saw her in November, 1919. The womb was very large and spongy, bleeding at a touch, with a thin muco-purulent discharge and a cervical erosion. Copper cataphoresis was given on November 17, 20, 24, and 27. A leading gynaecologist examined her at the time, and stated that if electricity could not remedy matters, there was nothing to be done except hysterectomy. Zinc ionization was given on December 11, 16, 23, and 30, and on January 3, 16, and 20, 1920. The periods became normal by the middle of December, and pregnancy followed in three months' time. Unfortunately, the pregnancy lighted up old lung trouble, and she became very ill, and miscarried in six months. Since then the periods have been regular, though since the miscarriage they have been more profuse than normal, but her general health has become too poor for her to come for further treatment. In this case also, a contraction of the womb to normal size during the second month of treatment was most pronounced.

The third case was sent by a gynaecologist with a diagnosis of fibrosis of the womb. The patient was a married woman, aged 36, who had lived for many years in the tropics. Her periods came fairly regularly, but were very profuse and very painful. She came only for three weeks, during which she had only six treatments, administered twice a week, with a platinum sound, 20 m.a. for eight to ten minutes. The sound was introduced only $\frac{1}{2}$ to 1 inch;

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it could not be pushed further into the cervical canal. After the ten minutes of stable treatment, I gave rhythmical galvanism for eight minutes, with the negative pole attached to the sound. Some months after treatment, the patient wrote that her periods had become normal in amount and painless. The gynecologist told me that the womb was "rejuvenated" in this case. Owing to the fact that in this case the periods were almost regular and there was no discharge, the local electrolytic effect of copper or zinc ions was not attempted. Yet the muscular tissue of the womb became more healthy than as it had not been for years previously. I have had three similar cases with identical reports by a gynecologist at the end of the treatment. Had the patient been able to remain longer for treatment, her sterility might have been remedied.

The importance of this fact of rejuvenation of the womb is the bearing it has on the question of sterility. No case of sterility should be regarded as hopeless until electrical treatment has failed.

In 1915, I was able to bring about pregnancy in a woman of over 30, who had considered it was a hopeless impossibility. She had always remembered profuse and painful periods; and the first sign of improvement after 12 treatments was the occurrence of a painless period—the first painless flow she had experienced for over 14 years. In that case I had begun with half a dozen applications of a secondary faradic current, and followed with a rhythmic galvanic current of 7 to 15 m.a. for 12 minutes, the positive pole in the womb, and the negative on the abdomen.

The fourth case, Mrs. M., is of much interest. She had been married over ten years, and anxious to have a child, but neither pregnancy nor miscarriage had occurred. She had always had dysmenorrhœa, but of recent years that had become much worse; there was no discharge, but the periods were profuse, and the intervals were less than the month. Five years previously she had been curetted, and the surgeon told her there was no fibroid and nothing wrong, except that the womb was too large; for a time slight improvement had followed. In March, 1921, when I first saw her, the sound passed over 5 inches into the womb. There was no discharge of any kind. Zinc and copper ionization were carried out on March 8, 11, 15, and 18, 20 milliamperes for 10 minutes with the copper, 40 m.a. with the zinc for 15 minutes. The period at the end of March was as profuse and painful as usual. The womb was still 5 inches long. Treatment was resumed on March 29, April 1, 5, 8, and 11, when a very painful period occurred. Treatment was given again on April 22, 26, and May 2. By April 8 the womb was reduced to $3\frac{1}{2}$ inches; by April 26 it was normal in size. After the womb had been reduced to $3\frac{1}{2}$ inches, a platinum electrode was employed instead of the zinc or copper. The next period was normal in amount, appeared at the normal time, and was the most free from pain she had ever had in her life.

The Prevention of Chronic Gonorrhœal Urethritis.

By M. W. BROWDY, M.B., CH.B.

London.

DURING the past few years much attention has been given to the subject of venereal diseases, and it is rather tragic that a great and calamitous war should have been necessary to awaken the minds of the medical profession to its duty regarding these maladies. Although for decades it has been known that serious consequences accrue from infection to man, woman, and child; yet the medical profession had not the courage to acknowledge that the treatment of these conditions was worthy of their highest skill.

PROPHYLAXIS.

More attention has recently been given to the prophylactic than to the curative treatment of venereal diseases. Some individuals have advised notification on the off-chance that the fear of this will deter people from exposing themselves to risk. I cannot agree with this theory. Its advocates can have no experience of a large private venereal practice; more harm than good would accrue, the fear of notification would deter the majority from seeking early advice, and surreptitious treatment, in spite of the law, would proceed rapidly. Innocent households would thus become infected, and finally, domestic peace would be disturbed, the medical man

probably spending half his time in the witness box. The remedy lies in educating the public to come immediately for treatment, and in providing facilities for that treatment.

Prophylactic "packets" are a snare; they give a position of false security and encourage the individual armed with this packet to seek promiscuous intercourse. Further, patients use these remedies for self treatment after the disease has commenced, with dire results. Reliance must be placed upon immediate treatment, within 24 hours of infection, before the gonococcus has time to penetrate the mucosa.

MEANING OF URETHRITIS.

Acute gonorrhœa is not a dangerous disease ; with skilled treatment and attention it is curable, and curable in a very short space of time. Yet during the last two years I have seen an enormous number of chronic cases, all of which were supposed to have had treatment. The chronicity varied from three months to ten years. Something, then, must be radically wrong with our therapeutics, and I have endeavoured to form some opinion about how far this state can be avoided, for no chronic disease is so widespread, no disease so tenacious and resistant to treatment. That resistance is seen in the almost daily introduction into our armamentarium of new instruments invented to treat by electrolysis, by heat, by suction, all of doubtful value, in fact, harmful.

The name "chronic urethritis" is worthy of explanation, for the term masks an incomplete diagnosis, and covers a multitude of lesions. A precise diagnosis is as essential as it is in affections of the eye and larynx, but the difficulty lies in the similarity of the symptoms and their paucity; the patient usually complains only of a discharge which may be so

abundant as to be continuous (gleet), it may be so intermittent as to form a drop (*goutte militaire*), or it may be so scanty as to cause agglutination of the meatus.

It may, or it may not, contain gonococci. Its source and origin may be widely different in different patients. On the other hand, there may be no signs or symptoms at all, yet grave pathological changes may be found if looked for. It is absolutely essential that a correct diagnosis should be made if a cure is to be obtained.

The following cases will suffice to demonstrate the similarity of symptoms complained of; all are examples of chronic urethritis, yet the diagnosis and treatment varied in each.

CASE 1.—J. C., æt. 25 years; sent to me by Dr. S., of Manchester. He had acute gonorrhœa five months ago, was treated with medicine at first and later with injections. This had no effect upon the discharge, about which he was anxious and so was referred to me. On urethroscopic examination, I found the lumen of the anterior urethra practically obliterated about midway by a soft infiltration. This admitted only a very small metal bougie. Dilatation twice weekly with a short Oberlander and later with a Kollman's expanding dilator caused a rapid improvement, a cessation of the discharge, and restored completely the lumen of the urethra thus saving the patient from the development of a definite stricture.

CASE 2.—Mr. H.; sent to me by Dr. L., of Blackburn. History of gonorrhœa 10 years ago, supposed to have been cured, complained of recurrent attacks of iritis. Saw eye specialist with very little permanent benefit. Had intermittent outbreaks of rheumatism which confined him to bed. Had teeth extracted as a source of infection was suspected. Dr. L. sought my advice as patient had a slight urethral discharge, intermittent in character, and he denied a fresh infection. After an examination I was able to prove his innocence. A source of infection was presumably present causing a systematic involvement, and in my experience the organs usually at fault are the seminal vesicles. I massaged the prostate and vesicles over a full bladder of silver nitrate solution, and masses of pus were expelled. With the emptying of these glands the patient made rapid progress. It is interesting to note the length of time the disease existed, and the amount of trouble it caused him.

CASE 3.—Mr. U. Acute gonorrhœa six months ago. Treatment

consisted of medicine and protargol bougies. Both patient and doctor became alarmed at a swelling appearing on the floor of the urethra, and the continuation of the discharge. So my advice was sought. A large follicular abscess was present, from which, on urethroscopic examination, pus was seen oozing. Under high dilatation and finally cauterization he made a rapid recovery.

CASE 4.—Mr. C., of West Africa. Contracted gonorrhœa three years ago. Was treated by injections for 18 months; the discharge ceased for a time but kept recurring. He came to London for treatment. Had injections of organic silver preparations and vaccines, sounds were passed periodically, but no improvement took place. He came to see me in despair, and talked about suicide. I urethroscoped him and the cause of the trouble was obvious. A pedunculated wart was present in the bulbous urethra, this I removed, after which there was no return of the discharge. No urethroscopic examination had previously been made, presumably because a meatotomy was required.

EFFECT OF THE CHRONIC DISEASE.

It is pitiable to witness the anxiety and suffering of those who are victims of chronic gonorrhœa. They wander about from one medical man to another, seeking relief. Their minds become obsessed with the idea that they are incurable. Eagerly they search their urine for threads, and perpetually keep squeezing their penis for pus, a habit from which it is difficult to wean them and so develop into typical hypochondriacs or neurasthenics. Whether this neurasthenia is due to a toxin or simply to the anxiety of the disease is a point worth considering. In my opinion, it is due to the former, for one often notices rapid improvement and the feeling of well-being after massage in enlarged prostate as if the patient was relieved of a toxæmia.

The attitude of mind is well depicted in the following extract sent to me by a medical man, a letter typical of hundreds. He writes:—

“I acquired a urethritis five years ago, and wish to know if I am cured and safe to marry. There is a slight ‘morning drop’ which worries me. I have had the secretion examined and the report was

gonococci absent but pus cells present."

The country is flooded with such cases, but in a more serious plight; such a state of affairs should not exist, and my contention is that it can be prevented by proper treatment in the early acute stage. By treatment, I mean skilled treatment and not a bottle of medicine. It is unfortunately a bad habit with some practitioners to prescribe medicine and an injection. The balsams do not cure gonorrhœa, and should be reserved for symptomatic treatment. Much harm has been done by faith in their efficacy; the discharge ceases or diminishes after a time, and so patient and doctor are lulled into a false position of security. I have a strong suspicion that these drugs when taken in quantity produce infiltrations of the urethra, for I have seen so many after their use. Whether this is cause or effect I cannot definitely state. No medical man should undertake the treatment of gonorrhœa unless he is prepared to use an irrigator and instruments to satisfy himself that a permanent cure has been obtained. If this was so, such an operation as internal urethrotomy would be a relic of the past.

CAUSES OF CHRONICITY.

If we go carefully into the reason why so many cases lapse into the chronic state we find that certain factors present themselves.

(1) Some are fulminating from the beginning probably owing to some local or general susceptibility or to an extreme degree of virulence of the germ. All the symptoms are exaggerated; the deep urethra and adnexa are rapidly involved; the patient is in a febrile condition, and must be confined to bed and treated as a febrile case.

(2) Apart from these patients, anatomical malformations such as para-urethral ducts, phimosis,

hypospadias or a small meatus, might prolong a case.

(3) Indiscretions in diet or exercise are distinctly harmful. It is remarkable what damage is done by alcohol, by cycling, or by horse riding.

(4) A new infection superimposed upon a damaged urethra from previous disease greatly hinders recovery, but by far the most serious consequences arise from—

(5) Delay and improper treatment. By improper treatment I mean insufficient or too vigorous.

ABORTIVE TREATMENT.

In some cases, but very rarely, the disease can be aborted. This can only occur before any inflammatory changes have taken place in the urethra, that is within 12 hours after infection. I am not an advocate for the use of strong antiseptics injected into the urethra, for not only is this treatment very painful, but disastrous results often follow. Many a case of severe stricture owes its origin to these injections. I have obtained satisfactory results from the use of acriflavine (1-100) and normal horse serum in equal parts. A small quantity is injected into the anterior urethra, and the meatus sealed. The patient is requested not to urinate for several hours. This treatment causes no pain, and is followed by no after effects. I combine flavine with serum for two reasons: first, because Browning¹ has shown serum increases the bactericidal action of this antiseptic; and secondly, large amounts of serum have a distinct bactericidal action on the gonococcus.² It is advisable to retain the fluid in the urethra for several hours, for after that time the lethal action of acriflavine is twenty times more potent.³

TREATMENT OF ACUTE STAGE OF GONORRHOEA.

It should now be firmly established that, at present,

there is only one successful method of treating acute gonorrhœa in the majority of cases, and that is Janet's urethro-vesical irrigations, or grand lavage of the French. No method on scientific grounds alone can offer so many advantages for its employment, and no method shows such satisfactory results when skilfully performed; this is proved by its almost universal adoption by those who propose to treat gonorrhœa scientifically.

I use a Valentine's irrigator with a Janet's nozzle. In my opinion, there is no other combination in the market to equal it. The apparatus is elevated about nine feet from the ground, that height is found to give sufficient pressure for all practical purposes. The variation of pressure, required for anterior and intra-vesical irrigations, or for coaxing the fluid through the "cut-off" muscle, is easily obtained by pressure with the thumb and index finger upon the stop-cock, and not by variations in height of the glass reservoir. This is a very important point. In fact, Wyndham-Powell's irrigator is designed for that purpose without a stop-cock, pressure being regulated by finger and thumb upon the rubber tubing. The nozzles are made of glass; they are cheap and easily sterilized, and the tips are varied in size so as to suit different sizes of meatus. A good many inventors of nozzles seem to focus their attention upon the back flow, as if an easy exit for the returning fluid is the essential factor in treatment. This easy exit counteracts all the advantages to be gained by irrigations, for one has to consider not only the antiseptic power of the fluid, but the hydrostatic pressure in ballooning the urethra, and so preventing in some measure the formation of soft infiltrations. It is quite simple to withdraw the nozzle slightly if we wish to allow the fluid to escape. Near the meatus are numerous glands and follicles, the Lacuna Magna and the valve

of Guérin, all liable to be damaged if the nozzle is inserted too far, especially as the mucous membrane is swollen and congested. Thus a follicular abscess often originates, greatly prolonging the disease and delaying recovery, and stricture commonly results about one inch from the meatus; yet an irrigator has been recently advertised, with a nozzle recommended to be inserted for one inch, equivalent to one-sixth of the length of the anterior urethra. The use of such an instrument would be a calamity. No instrument, soft or hard, should be inserted into the acutely inflamed urethra; the meatus alone should be blocked by the instrument.

IRRIGANTS.

The fluid I chiefly employ now for irrigating purposes is acriflavine in a 1-3,000 solution. I have used it for over two years with results far superior to that obtained with potassium permanganate; it is soothing to the inflamed urethra, it has great penetrating power, and is very bactericidal; the discharge usually begins to diminish within two days. In some cases, for some unknown reason, it seems to have no effect, and occasionally, but very rarely, patients complain of dysuria. The lotion must be used as hot as can be borne by the patient as heat is a deterrent upon the growth of the gonococcus. If the discharge has not materially diminished by the third day, I discontinue it and use pot. permang., 1-4,000. After the purulency has diminished and the thread stage reached, I prefer to discard flavine, for I believe it has no astringent property, and change to a strong solution of pot. permang. or zinc permang., 1-8,000. I am of opinion that a good many cases of folliculitis and urethral abscess are due to the employment of too astringent solutions in the early stage. No astringents should be used in

the first week; slight astringents may be used in the second week, and the astringency may be gradually increased as time goes on, finishing off with weak silver nitrate. The number of irrigants suggested is legion, but for the majority of cases the four mentioned are quite sufficient and far preferable. Silver nitrate seems to have a specific action in gonorrhœa, probably the reason being, because it coagulates albumen, and coagulated albumen is a poor soil for the growth of the gonococcus. If a cure is not obtained with these, then some complication has arisen which must at all costs be diagnosed and promptly treated, instead of "ringing the changes" with various medicaments. Irrigations should be given once or twice daily, but not more often; they must be given skilfully and with care, avoiding trauma of the delicate mucous membrane. My firm belief is that failure to obtain good results by Janet's method is due to the irrigations being given by unskilled persons who have no knowledge of anatomy or physiology, and I am inclined to think that this is also the cause of failure in the treatment of gonorrhœa now given in the treatment centres scattered over the country.

PRECAUTIONS BEFORE BEGINNING TREATMENT.

Before beginning treatment it is always advisable to make certain that the urethritis is due to the gonococcus, for one often meets with a (1) staphylococcic infection which is easily cured with a few washes of oxycyanide of mercury. A microscopical examination is thus essential.

One must be on the alert for a (2) urethral chancre; I have known such cases to be treated for months with irrigations under the impression that it was gonorrhœa.

In urethral chancre the discharge is very scanty, and comes on about three weeks after connection;

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it may be bloody, and on microscopical examination some pus cells and a few staphylococci are found. In the floor of the urethra a hard mass can be felt, which must not be mistaken for a follicular abscess; and later the inguinal glands enlarge. It is important to recognize these cases early, for valuable time will be lost if one waits for a positive Wassermann test or secondary symptoms. Immediate "salvarsan" treatment will keep the blood negative, and only a few intravenous injections will be required for a cure.

(3) Another difficulty often arises when a patient presents himself with a suppurating balanitis, or soft sore and phimosis. A little care will settle the diagnosis.

(4) Finally, herpes within the urethra is not an uncommon occurrence.

(5) A point worth noting and often overlooked is that which seems an acute infection is really a chronic urethritis with a relapse produced by excesses. So-called "strain" I believe to be an escape of pus containing gonococci, from an old sealed prostatitis; thus the whole urethral tract becomes reinfected. Hence, with a history of previous infection it is advisable to make a preliminary examination of the adnexa.

POSTERIOR URETHRITIS.

When one is certain that the case is one of acute gonorrhoea, it is advisable to see whether the posterior urethra is involved. In my opinion, it is affected more often than one suspects. I put it as high as 80 per cent., and do not trust too much to the two or three glass test, for often it is fallacious and so treatment erroneous.

The posterior urethra, I believe, can be infected through the lymphatics; there may thus be inflammatory changes, but not sufficient pus to flow back

into the bladder and so appear in the last glass. Hence, for all practical purposes, it is safer, after washing out the anterior urethra, to fill the bladder with the irrigant in every case. No force ought to be used; a little coaxing, aided by deep breathing or efforts to micturate, will overcome the action of the compressor. If this procedure was performed in every case, I think we should see less of complications. Instruments designed for the anterior urethra only ought to be condemned and relegated to the curiosity museum. If one has no doubt that the posterior urethra is acutely involved, greater precautions must be taken, for infection travels readily down the vas to the epididymis and backwards to the prostate and vesicles. If these organs become involved, the case will be greatly prolonged, and cause much misery and suffering.

The verumontanum, when bathed in pus, is liable to pathological changes and, having rather a good nerve supply, pain and neurasthenic symptoms arise. Involvement of the posterior urethra ought to be avoided at all costs. A good many cases are caused by the use of the hand syringe (an instrument which should never be used in acute cases) by badly-administered irrigations, by indiscretions in diet or conduct, and by the use of medicated bougies.

Medicated bougies are valueless. A case that can be cured by these bougies will be more readily cured by irrigations; and, if irrigations fail, cure will not be obtained by their aid. If the condition is progressing favourably, the purulency of the urine diminishes in the second week and only threads can be seen. These threads, composed at this stage of pus and debris, are of different shapes and sizes. Their macroscopical, or microscopical, appearance alone is not sufficient to indicate its source and origin, and a diagnosis without clinical examination

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is not warranted. Threads in the last glass may come from the anterior urethra, being adherent to its wall, and so with difficulty washed off. There is one exception, however, where a diagnosis of prostatitis may possibly be made, and that is when a shower of threads appear in the last glass, with the expulsion of the last drops of urine, although the first and second glass are practically clear. This is due to compression of the prostate by the muscular contraction of the bladder. A shower of phosphates may appear in a similar manner, but are distinguished from pus by being soluble in acid.

Threads gradually diminish and when none are present in an "overnight" urine, the patient is apparently cured; but no case must be dismissed without a careful examination of the prostate and seminal vesicles. Although the posterior urethra does not seem to have been infected, yet they are often found diseased, and if on palpation they are not found to be enlarged a little gentle massage upon a full bladder of 1-10,000 silver solution will be beneficial, and it is surprising how often pus will be expressed; also massage of the vesicles prevents agglutination and adherence of the vesicular ducts, an important point in chronic vesiculitis.

Further, every case should have a sound passed and the urethra palpated for enlarged follicles, which, if found, are massaged over the sound. Larger sounds are then passed periodically and the urethra over-dilated, so that if any infiltrations exist, they will be absorbed whilst in the soft stage and stricture avoided. If a pathological condition is discovered, one must not forget the possibility of another which requires treatment. I have recently seen a case treated by an Italian surgeon for an enlarged prostate, who was certified as cured, although a slight discharge was still present. This I found was due to an infiltration

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of the anterior urethra.

A urethroscopical examination is essential before the patient's dismissal, for often pathological changes such as littritis, inflammation of the lacunæ of Morgagni, warts, etc., exist, and might escape detection by other means.

A factor which must be borne in mind is the possibility of the man having infected his wife; she, being untreated, re-infects him, hence it is always advisable to make enquiries and, if possible, treat her.

VACCINES.

When vaccines were first introduced, and more recently when detoxicated vaccines were recommended, great benefit was anticipated; but I must say, that with the exception of cases in which a systemic involvement, such as rheumatism or iritis, has taken place, no benefit has resulted from their use in my hands.

INTRAVENOUS INJECTIONS OF ACRIFLAVINE.

In the treatment of acute gonorrhœa, one feels that something better is necessary than the ordinary routine methods, and it occurred to me that, possibly, the intravenous injections of acriflavine might be of value. Prof. Carl Browning informs me that 300 c.c. of a 1-1,000 solution had been injected intravenously into a man without ill effect; but it is advisable to make the injection slowly, that is, at the rate of 50 c.c. per minute if a 1-1,000 solution is used, or 25 c.c. per minute if the concentration is 1-500. I treated several patients suffering from acute gonorrhœa by this method and obtained extremely satisfactory results. I used the original "606" two-way stop-cock syringe, and injected 200 c.c. of a 1-1,000 solution on the first day, and 300 c.c. on the third day. The solution was made with sterilized normal saline and filtered through sterilized gauze. Within

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two hours the flavine could be detected in the urine by its greenish-yellow colour, and seven days after the injection it was still noticeable. The day following the injection, the urethral discharge had greatly diminished, and by the seventh the patient was dismissed as cured. There was no relapse. No adverse symptoms were observed after the injection; patients went about their work as usual. As the greater part of the drug is chiefly excreted in the urine, it no doubt exerts its action on the urethra; but I am inclined to think that there is also some action on the blood.

I am aware one should not dogmatize upon the result when only a few cases have been tested, and so only offer this preliminary note regarding the intravenous injection of acriflavine in acute gonorrhoea, in case others might care to try it in this disease; and, further, seeing such large doses can be given with impunity, it might be of use in pyæmia, septicæmia, and septic kidney conditions.

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The Therapeutic Uses of the Anterior Pituitary Gland.

By THOS. BODLEY SCOTT, M.R.C.S., L.R.C.P.;

AND

F. W. BRODERICK, M.R.C.S., L.R.C.P., L.D.S.

MUCH has been written about the pituitary gland as a whole; much experimental clinical work has been done with Pituitrin, the active principle of the posterior lobe, but in England little clinical work has been done with Pitglandin, the active principle of the anterior lobe, though, in its enormous influence on growth and development, it is the more important of the two. It is presumption, perhaps, to say that any link in the wondrous chain of animal vitality is more important than another. Still, in our working plans, we must differentiate somewhat between the vital and the non-vital. To recall to mind the physiology of the subject we give this quotation from Halliburton's *Handbook of Physiology*, 1917:

The anterior lobe consists of large granular cells and numerous blood-vessels. Its precise function is undetermined, although, probably, it is a vascular gland pouring an internal secretion into the blood, which influences growth. Abnormal hypertrophy of the pituitary produces the condition known as acromegaly, and if the view advanced above, of the anterior lobe, is correct, the condition is caused by an increase of its internal secretion. Feeding young animals on the anterior lobe hastens the growth of their skeletal tissues.

Later he says: "The pituitary body is essential for life." Cushing and Horsley found that total removal of the organ is fatal in a few days. The same result followed entire removal of the anterior

lobe. On the other hand, removal of the posterior lobe produces no such effect. Partial removal of the anterior lobe produces a condition known as hypopituitarism, in which adiposity, accompanied by atrophy of the organs of generation, are the most definite signs. If the operation is done before adolescence, there is a persistence of sexual infantilism. The transplantation of the organ from another animal, or injection of anterior lobe extracts, prolongs life after extirpation or relieves the symptoms after partial extirpation.

The work of Goetsch and Robertson has shown conclusively that the development and proper conservation of the genital functions cannot be secured without the active assistance of anterior lobe secretion.

Goetsch, of Chicago, again says :

Perhaps between no two of the ductless glands is a closer inter-relationship in function more demonstrable than between the pituitary and the sex glands. We know from experiments, in which the pituitary gland has been partially removed in dogs, that a deficiency in pituitary secretion thus produced is followed by underdevelopment, genital inactivity and hypoplasia in young animals, and by impotence, sterility and retrogressive changes in the sex glands, together with adiposity, if the animals were adult at the time of operation.

It is the secretion of the anterior lobe which is responsible for these sex changes. Clinical hyper-pituitarism is well exemplified in the diseases, gigantism and acromegaly. In the early stages of these diseases we find an exaggerated sexual activity, and in the late stages, corresponding with pituitary involution and inactivity, a disappearance of the sexual function.

It is perhaps rather humiliating to find that our well-being, and our proper development, bodily and mental, are so dependent on the health conditions of our lower animal reproductive functions, but the history of our evolutionary past is an integral part of our present make up from which there is no getting away.

Our egos must, therefore, strive and learn so to

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direct and curb these elementals that spiritual and bodily evolution should advance hand in hand.

The application of our knowledge of anterior pituitary function should prove very valuable, and already is full of hope.

Conditions due to abnormal anterior pituitary secretion naturally divide themselves into those of pre-adolescence and post-adolescence. The former are chiefly defects of growth and development, and the latter chiefly of function. The functional failures of adult life are often the result of unrecognized developmental faults in youth. In early adults the urge of life and the call for action are so intense, that for a time endocrine deficiency is almost obscured, but the poor material in the machine shows itself before long and power partially fails. This points to the importance of careful observation in childhood. We see children developing in a hesitating way, both in mind and body, not going straight. We are too apt to think of it as character-deficiency, or we call it laziness or wilful stupidity, but it is nearly always endocrine deficiency.

We see the extreme proof in the treatment of the crétin by thyroid, but these endocrine disharmonies are at work, unseen generally, and often very slight, through most of childhood's years. Much has been done by the thyroid treatment, but still more would be accomplished if we realized that thyroid and anterior pituitary deficiency generally exist together.

The thyroid perhaps tells more on the brain and nervous development and the pituitary on the osseous and the sexual, but no fast line can be drawn between the two influences. We see often the slow developing, dull adenoid type improve rapidly under thyroid as far as intellect is concerned, but the body and limb growth falters. Here the combination does excellently well. In girls especially, the

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intellectual life may be active and even brilliant, but the uterine and ovarian development are almost standing still, unobserved and untreated; these girls grow up sex failures. Never advancing beyond rudimentary growth of uterus and ovaries, they swell the ranks of the disappointed, the sterile, and the nervous invalids. They often begin to menstruate at 13 or 14, and go on for a year perhaps; then comes irregularity or complete cessation. This state of things, when not due to manifest anæmia, points almost conclusively to hypopituitarism, and can be helped wonderfully by anterior pituitary medication. It should be given in good doses for two or three years, or till healthy menstruation is well established. Under its influence the pelvic organs develop as nature demands.

It is well known that children of both sexes, who have enuresis, often get right under thyroid, but there are failures also, and, in these, the combination of the two gland extracts will often succeed. Failures of normal skeletal growth and osseous development especially demand pitglandin.

It should be an axiom, always in our minds, that endocrine deficiency is very rarely single, and, further, that the whole field must be considered before we can expect success in treatment.

Robertson, of Chicago, the discoverer of tethelin, his name for the active principle of the anterior lobe, has published some suggestive observations on the periods of life in which pitglandin has most effect. There seems to be a short time, after lactation has ceased, when the effect is one of retardation of growth, but as the period of sexual maturity draws near, there is rapid increase in growth and probably hastening of maturity. This emphasizes its value in the late years of girlhood. The life of an imperfectly developed woman is often a silent unsuspected tragedy.

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The further symptoms and effects of pitglandin abnormality are thus graphically described by Englebach, of St. Louis (*Endocrinology*, July-September, 1920).

The effect of the secretion from the anterior lobe upon the muscular tonus is a subject which has received comparatively little attention, but which has appeared to the writer as being almost as important as the difference present in the osseous growth and development. This is particularly striking when one compares the muscular development and tone of pre-adolescent hypopituitarism (Lorain-Levi type) with those of post-adolescent hyperpituitarism (acromegaly). The extreme difference in the genital function and development is also emphasized in comparing the foregoing two types. In the first (Lorain-Levi type) the genitals are infantile and functionless, with the presence of sterility and impotence; whereas, in the acromegalic, the genitals are unusually well developed and associated with hyper-sexuality. In pre-adolescent varieties of both over- and under-activity of this lobe, there is a tendency to decreased genital function. This is present as a cardinal sign in the hypopituitary post-adolescent subject, and is soon acquired in pre-adolescent hyperpituitarism, on account of the early transition to inactivity in this variety.

Decreased genital function and muscle tonus occurred so constantly with hypoactivity of the anterior lobe, that they established themselves as the best indicators of the state of activity of this lobe. Hence, the genital functions (menses, libido and potency) and the muscular tonus (muscle fatigue, or physical capacity), taken with the temperature, pulse, and blood-pressure, were considered, at the time of their determination, the significant signs of activity. The osseous changes, genital development, and secondary sex characters were interpreted as evidence of former activity, which might have changed to the opposite state.

After 55 or 60, when we often see endocrine deficiencies producing premature senility, pitglandin failure forms a very important part of the complex; it is generally associated with thyroid failure. The symptoms are the well-known ones generally classed under subthyroidism. These are, raised blood-pressure with its usual signs of cardiac strain and fatigue, shortness of breath, and easily-produced muscular fatigue. If the cerebral arteries are affected, there may be vertigo and tinnitus. In short, there are the symptoms of early arterio-sclerosis: premature sexual and vesical weakness, which so often occur, point to pitglandin deficiency. In practice, it is found that

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hormotone treatment by combinations of the thyroid and pitglandin are most effective.

Pituitrin should be avoided, for it tends to raise pressure. The pitglandin balances effectually the depressing effects of the thyroid, but it should be given in full doses, 2-6 grains of dried extract daily. My experience shows that it restores sexual and vesical power, and generally raises the tone and capacity of the whole system. It does not raise blood-pressure, but, I believe, helps to lower it.

While the anterior pituitary secretion in early life promotes growth and develops function, in old age it maintains function and for a long time counteracts the tendency to degeneration of tissue. This and thyroid, together, are the conservators, natural, not artificial, of life and energy.

Some forms of epilepsy have been successfully treated by pitglandin in America, and, as far as my limited experience goes, it holds out much promise in senile epilepsy.

The three following cases are interesting examples :—

A man of 70 developed frequent attacks of epilepsy, always at night. His blood-pressure was 180 mm. or over. Three years ago he was given thyroid, dried $\frac{1}{2}$ Ant. Pit. g. $\frac{1}{2}$, twice a day. This he has taken ever since and has had no attack for more than two years.

A man of 85 had three very violent epileptic attacks in four months. His blood-pressure was normal. He was given Ant. Pit. dried, gr. $1\frac{1}{2}$, twice a day and has continued them. He has had no further attack for ten months.

A man of 72 developed frequent attacks of petit-mal, generally when walking. His pressure was normal. Under $1\frac{1}{2}$ grains of Ant. Pit. twice daily, the attacks became fewer and have now ceased for more than a month.

These men had had no sign of epilepsy previously. The mental condition of these three men has much improved, and their tempers, according to the family reports.

It is quite safe to give larger doses than the above,

if necessary, for there seems to be no toxic effect.

It is rather humiliating to find that the practical science of endocrinology, from the therapeutic side, is not nearly so advanced in this country as in America. The nation that produced Sir Edward Schäfer, George Oliver and others, ought not to have lagged in the rear. This may be largely due to our absorption for many years in medical subjects pertaining to the Great War. This lack of the newer knowledge was very evident in the recent discussion on Graves's disease at the Royal Society of Medicine. Hardly an allusion was made to the endocrine treatment of that condition (a typical endocrine disease), which in many hands has been so successful, both at home and abroad. Surgery, which has been happily, and in this case justly, called the opprobrium of medicine, was in the lordly ascendant. The ideal of endocrine treatment is essentially conservative. It is not the destruction or removal of disease, but the restoration of the normal balance of power to the organs that rule our life.

From the fact that the anterior pituitary governs bony growth, it seems possible that it may have some action on the calcification of the teeth, and the work of one of us seems to point to a pluriglandular syndrome being responsible for dental caries; for a full discussion of this subject readers are referred to a paper entitled "The Effect of Endocrine Derangement on the Teeth," published in *The British Dental Journal* of October 15, 1920, in this country, and in *The Dental Cosmos* of February, 1921, in America. In this paper evidence is presented that after acute fevers the titration reaction of the saliva is towards a loss in alkalinity, and that this can be overcome by feeding with a plurigland containing hormones that increase the assimilation of lime salts, viz., parathyroid, anterior pituitary, and suprarenal; intra-

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muscular injection of these glands also increased the alkalinity and calcium index of the saliva. It is also suggested that organotherapy is able to increase the calcification of teeth, both enamel and dentine, after eruption; that teeth harden normally after eruption, there is much clinical evidence to prove, and although the possibility of hypercalcification of dental enamel from within is denied by some histologists, it seems impossible to deny that, other things being equal, a tooth that has been erupted ten years is harder than one erupted two. On the other hand, it is also evident, from clinical observation, that in certain diseases, *e.g.*, acute tuberculosis and diabetes, the enamel is much softer than normal, which would seem to point to the fact that the teeth have the power of taking up, or giving out, lime salts according to the state of bodily health, but whether this is performed through the blood stream *viâ* the pulp, or through the saliva by an osmosis from saliva to teeth or *vice versâ*, remains to be proved.

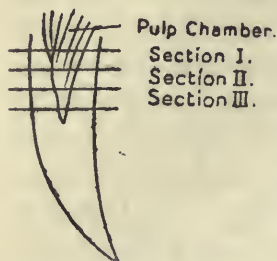
The results of feeding experiments in rabbits is not without interest in this connection; and, though probably in no way conclusive, are certainly suggestive. Two rabbits of the same litter were fed similarly, except that to the food of one was added a plurigland containing anterior pituitary, gr. ii; suprarenal, gr. ii; parathyroid, gr. $\frac{1}{16}$. This was continued daily for four months.

Rabbits were chosen because their teeth are of continuous growth, they wear away at the biting edge at the same rate as they grow from the pulp end, and it was thought that possibly any hardening of the teeth might cause the wearing away to be slower than the rate of growth. At the end of two months the incisors of the plurigland rabbit were perceptibly longer than those of the control, to the extent of about one-third; at the end of four months, however,

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the increased length was considerably less than this.

Two analyses of the teeth were then undertaken:



the first, by complete incineration, to give the total amount of inorganic matter; the second, to estimate the total calcium content. For analysis I. three sections of the tooth were taken, and the estimations performed separately; for the second, a whole

tooth was used. The results of these analysis are appended:

SECTIONS OF TOOTH IN ANALYSIS I.

Plurigland Rabbit.

Section.	I.	II.	III.
Weight of substance - - -	0·0187	0·0067	0·0114
Weight of ash - - -	0·0113	0·0048	0·0079
Loss of weight - - -	0·0074	0·0019	0·0035
Percentage inorganic material	60·4	71·6	69·3

Control Rabbit.

Section.	I.	II.	III.
Weight of substance - - -	0·0125	0·0190	0·0159
Weight of ash - - -	0·0084	0·0134	0·0107
Loss in weight - - -	0·0041	0·0056	0·0052
Percentage inorganic material	67·2	70·5	67·3

The comparison showing in—

Section I	a loss	in inorganic material of	- 6·8 per cent.
„ II	a gain	„ „	- 1·1 „
„ III		„ „	- 2·0 „

ANALYSIS II.

Plurigland Rabbit.

Weight of tooth - - -	·1810 gram.
Percentage calcium - - -	33·6 per cent.

Control Rabbit.

Weight of tooth - - -	·1432 gram.
Percentage calcium - - -	29·19 per cent.

The comparison showing a gain in calcium salts of

4·41 per cent.

The loss in inorganic material in the section nearest the pulp end of the tooth, *i.e.*, the part calcified latest, makes the total increase in lime salts in the whole tooth even more suggestive than it would seem at first sight, for it shows that the increase at the biting edge must be more than 4·41 per cent.

In explanation of the fact that the tooth of the plurigland rabbit, though softer at the pulp end, would seem to harden progressively as we approach the biting edge, I suggest, that the gland-feeding for a time stimulated the laying down of lime, but, later, owing to the large doses (considering the size of a rabbit), atrophy of the secreting cells was brought about, in the same way as a subject of Graves's disease may, in later life, suffer from symptoms of myxoedema, and that, although for a time calcification was improved, at a later date it was to some extent prevented.

This suggestion is strengthened by the fact that when the skulls were examined after death it was found that in the plurigland rabbit there was considerable absorption of alveolus in the upper jaw, very suggestive of pyorrhoea alveolaris, and in one molar a destruction of tooth tissue which I believe to be dental caries.

We consider that the former condition was produced during the period of excessive lime assimilation, and the latter during the period of semi-calcium starvation.

It seems probable that the predominant partner in the plurigland used is the anterior pituitary; and the use of this natural help in early life should, if these findings can be repeated and verified by others, go far in preventing the caries of childhood and adolescence, by producing a condition of immunity by hypercalcification of the enamel.

The Physical Treatment of Enteroptosis.

By CORTLANDT MACMAHON, M.A. OXON.

Instructor for Speech Defects and Breathing Exercises at St. Bartholomew's Hospital, etc.

THE condition of the patient suffering from enteroptosis is very wretched. The almost constant physical and mental weariness, accompanied by the general discomfort present in the abdominal region, causes the patient to become extremely depressed, pessimistic, and quite unable to feel any real exhilaration in existence. There is often a sensation of nausea, due to the fact that the displaced stomach is rarely cleared of a heavy mucus. On examination it will, it is believed, invariably be found that there is, in enteroptosis, a collapse of the lower ribs in addition to the abdominal wall being advanced in a most noticeable way. In some the giving way of the muscles is extraordinary. When asked to expand the lower ribs on a line with the bottom of the sternum, the patient at first gives practically no response. The viscera, therefore, have not their original accommodation in the abdominal cavity, and recovery, to be complete, cannot occur until this accommodation has been made by training the muscles of the thorax to function perfectly for expansion of the inferior lateral costal region. The lower chest is broadened out by exercises, so that it is nearly in a vertical line with the axilla. When this is accomplished, there is at once a partial mechanical support of the viscera due to the action of the oblique and transverse muscles of the abdomen, and when the

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exercises described below are begun, the rectus muscle becomes actively in use and the abdominal wall as a whole is made extremely powerful. The dragging pain present in enteroptosis may disappear in a few days after the physical treatment has begun, and the patient has the satisfaction of knowing that his or her own efforts are helping to win back health. This fact plays a very important part in the mental attitude of the patient, and optimism and determination to get well supplant the former feeling of distress.

If enteroptosis is treated in its early stages, no artificial support should be necessary, but a well-fitting belt will give considerable comfort in a severe case; the fact, however, that unless physically exercised, the abdominal muscles must become gradually weaker and the weight of the viscera thrown more into the belt should be carefully considered, and, if a belt is worn, the exercises are just as necessary. By degrees, the belt should be discontinued for intervals, and possibly someday it can be discontinued. It would, however, be unwise to leave it off during a long day's shooting or golfing, for over-exhaustion might easily cause a weakness of the support given by the muscles which had not got back their full tonicity, and a temporary relapse might occur. The patient must learn that any slack posture of the body when either standing or sitting is dangerous, and the lazy way in which so many people sit when at meals is quite enough to aggravate the symptoms of enteroptosis. When standing or walking, the body should lean a little forward from the hips and the shoulders should be pressed back. This movement raises the upper chest a little if the rectus muscle of the abdomen, strengthened by exercises, is slightly contracted. The lower ribs by training are permanently well expanded, and the support of the

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viscera is assured.

The chief exercises used are as follows: All the early exercises are done in a recumbent position. Each exercise is carried out 18 times. This will not exhaust the patient, if a rest is taken after 6 movements of each exercise.

Description of Exercises.

1. The operator places his hand on the lower ribs on a line with the bottom of the breast-bone. The patient breathes in strongly, and the lower ribs are forced outwards. When the fullest expansion has been made, the patient breathes out quickly.

2. The same movement is made but the breath is taken in three distinct movements and the greatest expansion occurs on the third movement.

3. The muscles of the abdomen are contracted in three separate movements as a physical act only. The operator helps the contraction by gently pressing on the lower portion of the abdomen.

4. The lower ribs are expanded on the act of inspiration, and without a pause the air is expelled from the lungs by a powerful contraction of the abdominal muscles.

5. The same movements, but the air is expelled in three to five separate contractions of the abdominal wall.

6. The lower ribs are expanded as before but the breath is now held, and the abdominal muscles are contracted slowly and powerfully, at first with one contraction of the abdominal muscles and by degrees up to five contractions. The lower ribs must be strongly expanded during this exercise, and the operator must help the ascent of the viscera by a steady upward pressure on the lower portion of the abdomen. This exercise gives the greatest expansion of the lower ribs.

Further exercises are given which generally tone up the muscles of the body.

In a fairly young or middle-aged patient, when the condition is not severe, six to twelve treatments are quite sufficient, the patient carrying out the exercises, as shown, during and after treatment. It is very necessary to impart great confidence and optimism to the patient as to the prospect of rapid improvement and eventual recovery, which is quite justified as one knows from the doctor, who has advised the physical treatment, that no organic disease is suspected.

Anxiety.

By W. J. JAGO, M.R.C.S., L.R.C.P.

Neurological Specialist, S.E. Region, Ministry of Pensions.

THERE are two kinds of anxiety. One, the true anxiety, which is physiological and self-preservative, a rational reaction (mostly motor—flight-reflex) against an external danger. This form has little interest to general medicine, though the mental conflict between the desire to react to the normal flight-reflex and the desire to obey past educational injunctions (*i.e.*, it is a sin to be a coward, altruism, etc.) has been brought forward as one of the causes of the war-neuroses. Mere inhibition in the presence of danger—petrified with fear, as opposed to purposive inactivity whilst awaiting events—must be classed as pathological.

The other form is the neurotic, or morbid, anxiety which occurs without apparent external cause, or is out of logical proportion to the cause, *i.e.*, fear of moths, crossing open spaces.

Patients do not always use the word anxious in describing their symptoms. They may say they feel "rotten" or "nervous," or some term that may be used with conditions not connected with anxiety. So it may be necessary to get them to explain their feelings a little more explicitly.

In some cases of anxiety it is not difficult to see that you are dealing with a neurosis. For instance, when the patient tells you that if he omits to touch every third lamp-post, he feels that something terrible will happen (obsessional-neurosis), or that he has to return several times to satisfy himself that he has completed some action, such as shutting the front

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door at night, turning out the lights.

Nor in phobias will you find much difficulty, for the patients will complain that they have a fear of this, that, or the other, whatever their particular phobia may be.

But there are times when you may be caught if you rest content with the symptoms that the patient gives you. A stomach hypochondriac may tell you all his gastric symptoms and omit his anxiety lest he has cancer, or of going from home lest he is unable to get the special dietary which he has decided suits him.

There is one condition which despite the variety of its symptoms is now becoming recognized as a definite syndrome—the anxiety neurosis—and in which the anxiety may be overlooked or disregarded. In order more fully to understand this condition let us consider what may occur in a state of real fear.

1. Apprehension of danger.
2. Sensation of stoppage of the heart's action, sometimes leading to an actual faint or a fear of impending death. This is followed by palpitation and giddiness.
3. Spasm of the respiratory muscles followed by dyspnoea.
4. Muscular tremblings.
5. Excretory activity; sweating, desire to micturate or defæcate.
6. Increased acuity of the special senses.

Any or several of these symptoms may be present in the anxiety-neurosis, but as some of them may be present in physical conditions there is a good opportunity for an error in diagnosis. To enumerate the more usual symptoms.

1. Anxiety under trivial circumstances. A jolting bus, a call to the manager's office, a creaking board at night, may create a feeling

of mild fear in the patient.

2. Palpitation, sometimes with præcordial pain (D.A.H., pseudo-angina), sudden feelings of faintness (suggesting cardio-vascular disease) or brief mental confusion (giving rise to a suspicion of petit-mal).

3. Dyspnœa and asthma-like attacks. These frequently happen at night after the patient has been resting some time, whilst true cardiac or respiratory symptoms usually occur after effort.

4. Shakiness on exertion or excitement (on examination of the patient, for example).

5. Periods of frequency of micturition or diarrhœa. This latter has been the source of a good deal of mistaken treatment, though the neurotic element in many cases of "mucous colitis" has long been recognized.

6. Increased acuity of the special senses is shown in the excessive reaction to sudden noises; increased sensibility to light giving rise to photophobia and a suspicion of ocular disease. The hyperacusis, especially when accompanied by apprehension, is a cause of insomnia, for these patients are awakened by the slightest sound.

To this list may be added dreams, often of a terrifying nature, though sometimes the dreams either do not, or only momentarily, come into consciousness and the patient wakes in a "fright," or "with a start." The so-called war-dreams are of this kind, and, incidentally, are not the prerogative of the "shell-shocker." It must be remembered that dreaming may be the result of bodily stimuli, of which the nightmares of indigestion and the sleep-starts of aortic regurgitation are well-known examples.

Morbid anxiety, like true anxiety, is often a defence mechanism, for if a patient ignores the warning of his phobia, he would soon find himself in a much

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worse mental state as a result of his temerity. So may an organically determined anxiety-state act as a defensive measure.

A painter and decorator, æt. 55, had been troubled for six months by a phobia of ascending ladders, the mere thought of having to do so brought on an acute anxiety-state. His occupation suggested a reason: paint—lead—arterio-sclerosis—giddiness. The suspicion was justified, for he was found to have markedly thickened and tortuous arteries. On inquiry he admitted that for two years past he had been subject to transitory attacks of giddiness, especially (as might be expected) after the effort of climbing a ladder, and had several times feared that he might fall from the scaffolding. It would appear that the phobia prevented him from putting himself in a position of danger.

I have elsewhere¹ given an example in which war-dreams of four years' standing were stopped by the removal of a somatic cause.

There is one source of anxiety which is so often overlooked—home worries, family or financial. But even here the question arises, is there any reason in the patient's mental or physical condition why he is unable to adjust himself to the circumstances?

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General Practice and Puerperal Fever.

By A. CAMPBELL STARK, M.B.

Late Lecturer on Biology, Westminster Hospital Medical School; late Demonstrator on Materia Medica, St. George's Hospital Medical School; late Assistant Surgeon to the British Skin Hospital.

RECENT statistics show a considerable increase in the number of deaths from puerperal septicæmia.

It is natural that this fact should arrest the attention of the teachers of midwifery, and some of them have spoken with no uncertain voice on the cause of the increase and the remedies for it.

Their views have been solemnly endorsed by other writings. As these views are open to criticism, and are likely, if adopted, to have a far-reaching effect, it will be useful to state them concisely. It is obvious, from the numerous letters which have appeared on the subject, that very few practitioners realize their significance. Moreover, the invidious reflection cast upon the general practitioner, and the effect this is likely to have upon the general public, call for a careful enquiry.

The position of official midwifery is this:—

The cause of puerperal fever is the general practitioner who directly infects the patient with the causal organisms of the disease. This he does by—

- (1) Introducing organisms into the patient by his hands, his clothes, or his instruments.
- (2) Pushing organisms from the patient's vulva into the vagina with his fingers.

Incidentally, it may be noted that the husband

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may be responsible. The remedies proposed are :—

(a) Not to touch the patient at all or, if this must be done, to examine the patient solely with one finger in the rectum;

(b) Always use sterilized rubber gloves.

It is difficult for anyone who has had much practical experience to accept these contentions. The essential bacterium in a case of puerperal fever appears, in the majority of cases, to be a hæmolytic streptococcus. Such an organism is probably present in the fæces and is therefore likely to occur in the patient's perineum and vulva, but is certainly rare on the hands, etc. of the average general practitioner, and it is impossible to believe it can be active after the hands have undergone the usual soaking in a mercuric antiseptic.

Direct supply of infection to the patient *must* therefore be extremely rare. There remains the plausible theory that organisms are pushed from the vulva into the vagina. Incidentally, of what possible value can the use of rubber gloves be in this connection?

Apart from the fact that most men swab up the vulva with an antiseptic before making an examination, assume that germs are carried up. They can only be carried a short distance and must in any case be far from the placental site. The placental site is supposed to be the focus of infection. The theory assumes that organisms, all of which (except the *B. Coli*) are non-motile, travel up several inches from the vagina against the descending current of blood and amniotic fluid and reach the placental site. This seems, to say the least of it, to be most improbable. The theory is comparable to that which assumes that the pyelitis so common in women is caused by the ascent of organisms *viâ* the ureter from an infected bladder. How many men who have

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studied the question believe in this theory now?

Surely it is more likely that the bacteria reach the placental site *viâ* the blood-stream. Given an infected perineum and a breach of the surface, inevitable in most labours, and there is a passage for entry into the blood-stream of the causal organisms; this is auto-infection. It is only in this way that the undoubted fact of the occurrence of puerperal fever in patients who have not been touched by doctor or nurse can be explained. It is a well-known fact that the large majority of cases in which the placenta is removed by hand make an uninterrupted recovery. The greater number of these operations are performed with the naked and disinfected hand and arm. Here is a crucial test of the transference of germs theory, and it breaks down.

If it is indeed true that the methods advocated are the best possible, it is an opprobrium to the present-day midwifery.

The best it can do for the modern young woman undergoing the painful and laborious process of giving birth to a child is to leave her alone. Not because it does not know what to do, or because it has not the skill to do it, but because it is so uncertain of the condition of its hands, its instruments, and the patient's skin, that it is afraid that it may infect her with septic organisms.

Practical Notes.

Whooping-cough.

I. *Infectivity*.—Professor Weill has demonstrated that the infection chiefly occurs during the preliminary stage, that it becomes more and more rare when the fits of coughing appear, and that it disappears at the end of a week, or at most two weeks, after the cough has assumed its characteristic condition. He observed that whooping-cough was never infectious after the admission of children to the hospital, and that this was related to the fact that the children are admitted only after the whoop has appeared. He carried out an enquiry of some duration upon 104 children of less than seven years of age, who had never suffered from the disease, and were mixed with 26 children suffering from an attack but had not gone beyond the fifteenth day of the stage of coughing fits. These children were allowed to play together, took their meals together, exchanged cups, plates, and glasses, and slept in adjacent beds. Under such conditions he did not observe a single case of transmission, and the fact that the exposed children were not immune to the disease was proved by several of them suffering from an attack later in life. Analogous observations in various places have confirmed the opinion he expressed, but some writers state that they have often observed whooping-cough transmitted during the coughing stage. Grancher reported 9 cases of infection in a series of 357 cases treated in his wards, but in 4 of these the infection was proved to have been contracted during the early stage.

II. *Clinical Bacteriology*.—A parallel study of the infection and of the bacterial growth was made in 1916 by Chiemnitz and Meyer in Denmark, who searched the expectoration for the bacillus at different stages of the disease. During the early catarrhal stage the bacillus was found in 32 out of 39 cases. During the coughing stage, the result was nearly always positive at the end of the first week. At the end of the second week, the bacillus was found in two-thirds of the cases; at the end of the third week, in one-third; and at the end of the fourth week, the culture was successful in only 1 out of 36 cases. These bacteriological results show that the bacillus is constantly present in the expectoration during the catarrhal stage, and during the first week of the whooping stage, thus agreeing with clinical observation. The presence of the bacillus in two-thirds of the cases until the end of the third week does not accord with the clinical observations, which show that after the second week of the coughing stage infection has practically disappeared. Weill considers that it is possible that after the second week there is an attenuation of the virulence of the Bordet-Gengou bacillus either spontaneously or by reason of the presence of associated micro-organisms.

III. *Prophylaxis*.—Weill points out that in face of these

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observations, the length of time during which whooping-cough is infectious, and during which isolation is necessary, is fifteen days after the onset of the coughing stage in accordance with clinical observation or thirty days in accordance with bacteriological results. In any case, the closing of affected schools for 50 days after the disappearance of the last fit of coughing, now imposed in France, is not only unnecessary but seriously interferes with the children's education for some months. In Denmark, children are allowed to return to school one month after the first coughing fit.—(*La Médecine*, August, 1921.)

Treatment of Migraine in Children.

Migraine is sometimes met with in the child, especially after the seventh or eighth year, and presents very nearly the same characters as in the adult: headache, photophobia, nausea, and vomiting. It comes on in attacks of some length and with varying frequency. It is an affection of very protracted duration and which, later in life, makes other more serious manifestations of the arthritic diathesis—gout, asthma, diabetes—to be feared. The treatment is different during attacks and during the interval between.

A. *During an Attack.*—(1) The child should be placed in a dark room, the curtains in which should be drawn, kept at a fairly cool temperature (16° C.). All the symptoms of migraine are made worse by noise, light, and movements, and are relieved by silence, darkness, and lying still. (2) *Diet.*—Lemonade acidulated by citric or tartaric acid, weak tea, and especially coffee should only be allowed. (3) *Drugs.*—No drug is able to suppress the pain completely, but there are some which have a sedative effect. The nausea prevents these being given by the mouth, so that recourse must be had to enemata, or preferably suppositories. *Quinine*, at the beginning of an attack 0.15 to 0.20 g. of sulphate or hydrochlorate of quinine should be given, and this dose may be repeated on the same or the following day. *Antipyrine.*—Children from 8 to 12 years old may be given from 1.50 to 2 g. in the day by suppositories containing 0.10 to 0.30 g. *Chloral.*—Small doses are given in the case of insomnia and of agitation. It may be associated with one of the foregoing—

Chloral hydrate, 0.15 g.; antipyrine, 0.50 g.; cacao butter, 2.00 g. for one suppository.

B. *In the Intervals between the Attacks.*—Treatment consists of hygienic rules, and regulation of food. In addition, a sedative of the nervous system may be given as medicine. (1) *Hygiene.*—Intellectual overwork must be avoided and the child must have plenty of recreation and long holidays. An open-air life by the sea or in the mountains is recommended according to the special indications. A course of physical exercises should be carried out. (2) *Food.*—Care is needed in watching the food, especially if the child is dyspeptic, for an attack may be precipitated by the least gastro-intestinal upset. The fluids must be rationed, and a vegetarian diet is advisable, because animal proteins often have a harmful effect.—(*La Médecine*, August, 1921.)

Reviews of Books.

Industrial Colonies and Village Settlements for the Consumptive.
By Sir GERMAN WOODHEAD, K.B.E., V.D., M.A., M.D., LL.D.,
and P. C. VARRIER-JONES, M.A., M.R.C.S., L.R.C.P. Pp. 151.
Cambridge : University Press. 10s. 6d. net.

AFTER reading this book one feels buoyant; especially if one is suffering from consumption and has friends and relatives so suffering. From that point of view, the book is indeed welcome. Is it practical, however? Can the *ideal* be carried out practically from an economic and financial standpoint? The authors say "yes"; experienced readers will remain silent, or, at least, the large majority of them. Industrial colonies of village settlements are the natural corollary of sanatorium treatment, and the subject is well worked out and excellently put before their readers by the authors, who are to be congratulated upon their endeavours to bring, not a ray, but rays of hope to thousands and thousands of consumptives. The introduction of sanatorium treatment did the same, but, where is sanatorium benefit, the Government's *panacea* for consumption to-day? The Papworth Colony and the Papworth Village Settlement stand out as an object lesson, and it is well to have on record a history of the Papworth Movement and the conditions that led up to the ideal. This record is admirably done by the two enthusiasts, the authors of the book.

Essentials of Physiology. By Professor F. A. BAINBRIDGE, M.D.,
and Professor J. ACWORTH MENZIES, M.D. Fourth edition.
Pp. viii + 497. London : Longmans, Green & Co. 14s. net.

THIS fourth edition of this well-known text-book differs little from its predecessor; only a few of the sections having been rewritten. It gives an excellent up-to-date account of modern physiology and is an ideal book for the practitioner who desires to refresh his knowledge. The text is very fully illustrated, the representative tracings forming an especial feature. The relationship of physiology to practical medicine is well brought out in the chapter on the ductless glands, photographs of typical cases showing the effects of withdrawal of the various secretions, and the work of the Glasgow school on the relationship of the parathyroids to guanidin metabolism and tetany is mentioned.

Hygiene. By W. WILSON JAMESON, M.A., M.D., M.R.C.P., D.P.H.,
and F. T. MARCHANT, M.R.San.I. Pp. 404. London : J. and A.
Churchill. 18s. net.

THIS may be described as another of the many books on hygiene (for the use of students) that periodically appear, and which are

best classified as the "also rans." They fail to get home like the well-known classic text-books. The present one is no better and no worse than many others that have appeared. The authors are, or were, assistants to Dr. Kenwood at University College, and have dedicated their book to their well-known master, who is himself joint author of one of the best known text-books on Hygiene! The authors do not claim more for their book than that it is an epitomy of the views of others—a collection of notes used for teaching purposes at University College, for D.P.H. students.

The book consists of nine sections dealing with the usual subjects to be met with in a treatise on hygiene. The facts, as put forward, will be found useful for D.P.H. students, who, on page 389, are referred to some, but only some, of the well-known text-books, from which the authors have gathered such facts. There is a very good index.

Genito-Urinary Surgery and Venereal Diseases. By EDWARD MARTIN, A.M., M.D., F.A.C.S., BENJAMIN A. THOMAS, A.M., M.D., F.A.C.S., and STIRLING W. MOORHEAD, M.D. Pp. 928. London: The J. B. Lippincott Company. 35s. net.

THE twelfth edition of White and Martin's text-book appears in this revised form. Owing to the rapid exhaustion of the eleventh edition, the authors have not found it necessary to make many changes in the text. A number of illustrations, some from photographs and others from drawings, have been added. There are a few illustrations of radiograms which have, however, lost a good deal in reproduction. Syphilis is fully discussed in 200 pages, and the subject is well illustrated. The volume has not increased in size with successive editions. This text-book will undoubtedly retain the high position it has held for many years. It is a valuable addition to the library of the surgeon and the practitioner.

The Blind, their Condition and the Work being done for Them in the United States. By HARRY BEST, Ph.D. Pp. xxviii + 763. New York and London: The Macmillan Company.

THE author here presents us with a thorough and accurate study of the blind in the United States and of the work being done for them; work which is tending to a diminution of their numbers and an amelioration of their hardships. The scope of the book may be gathered from an enumeration of the seven parts into which it is divided; they are as follows: General Condition of the Blind; Blindness and the Possibilities of its Prevention; Provision for the Education of Blind Children; Intellectual Provision for the Adult Blind; Material Provision for the Blind; Organizations interested in the Blind; Conclusions with respect to the Work for the Blind. The first six parts together contain 45 chapters, every aspect of the subject receiving full attention. There are also four appendixes, a good index, copious foot notes, and a wealth of tables, statistics, and references.

The relationship of blindness to the law includes chapters on

indemnities for loss of sight through suits at law and through compensation laws. There are also chapters on pensions and insurance.

There is an interesting account of the history of the education of the blind, in which it appears that Girolimo Cardano (1501-1576), a physician of Pavia in Italy, was one of the first to bring instruction to the sightless, for, "having become interested in the deaf and their education, he conceived the idea that the blind might be taught through the sense of touch and attempted to procure to some extent instruction for them."

It is quite impossible to do justice to such a comprehensive work within the limits of a short review, and those interested in the subject must go steadily through this interesting book for themselves. They will find it a rich mine of valuable information.

The Theory and Practice of Massage. By BEATRICE M. GOODALL-COPESTAKE, Examiner to the Incorporated Society of Trained Masseuses, Teacher of Massage and Swedish Remedial Exercises to the Nursing Staff of the London Hospital. Third edition. London: H. K. Lewis & Co., Ltd. Pp. 270 + xx. 20 plates and 69 illustrations 12s. 6d. net.

It is not given to every author to produce three editions of a book in about as many years, and the compliment thus paid by her students has induced this author to be content with making a few additions to the second edition, while leaving most of the former material *in statu quo*.

Though only five pages and two plates are added, the increase in the cost of the price of production by some 33 per cent. within eighteen months is indicative of the rise in cost of scientific and educational works. This is a hardship which is common to all present-day students, who are thereby compelled to exercise great care and discrimination in the selection of their text-books. Many will choose the book under notice for this purpose, and they will now find their choice justified.

The new chapter on muscle re-education should serve to stimulate reference to books which deal with this important branch of work more extensively, and the same applies to many other sections. The bibliography provided should indicate to students what books to borrow from a library for the purpose; they should not rely entirely on the text before them for full guidance in their work.

Preparations, Inventions, Etc.

ETHER INHALER.

(London : Messrs. Allen and Hanburys, Ltd.,
48, Wigmore Street, W.1.)

Dr. H. C. Visick has designed an ether inhaler which will deliver a vapour of sufficient strength to maintain a satisfactory anæsthesia with or without a mask. The principle is that of the Junker inhaler adapted by size to deliver the 15 per cent. vapour required for ether administration. The essentials of such an apparatus are simplicity, portability, and safety.

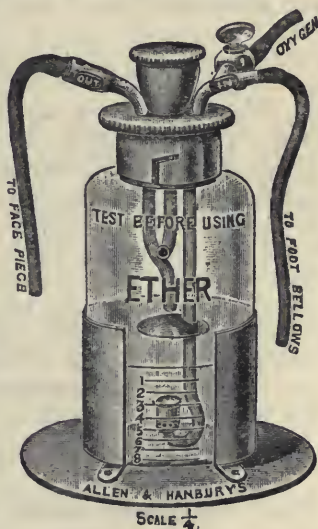
This inhaler consists of a strong, glass jar with a nickelled metal cap, which carries the inlet and outlet tubes and a funnel between for pouring in the fluid ether. It is graduated to one-third of its height to hold eight ounces of ether.

The inlet tube is bifurcated, one branch being for connection to an oxygen cylinder when required, and the other with the bellows, hand or foot. The outlet-tube carries a rubber tube, three feet long, which is attached to the mask, a mouth-tube, or a gag, as required.

Faulty adjustment and the blowing-over of liquid ether has been prevented by the introduction of two ball-valves, which admit the passage of vapour in one direction only, so that when a faulty adjustment has been made the inhaler will not work. A large splashers is placed below the outlet-tube, which effectually prevents the entrance of any liquid ether. To make this quite impossible, the open end of the outlet-tube is placed centrally above the splashers, so that no fluid can enter it in whatever position the bottle may be placed, on its side or upside down.

The bottle can be carried in the pocket of the anæsthetist's coat, or placed upon a side table for which a light aluminium holder with a wide flange is provided. To counteract the chilling effect of the air or oxygen bubbling through the liquid ether, the bottle itself may be placed in hot water, or a lead-coil immersed in boiling water, placed between the bellows and the bottle.

The apparatus with the holder can easily be carried in an ordinary



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sized bag, with its charge of ether in it.

SACHS-GEORGI ANTIGEN ("Wellcome" Brand).

(London: Messrs. Burroughs, Wellcome & Co.,
Snow Hill Buildings, E.C.1.)

This preparation is a modification of that recommended by Sachs and Georgi for the diagnosis of syphilis, and provides the physician with a laboratory test which is fairly reliable, is easily carried out, and requires only one reagent and very little apparatus. The Sachs-Georgi test is based upon the fact that, in the presence of syphilitic serum, flocculation takes place in a suspension of cholesterinized extract of heart muscle. In practical tests with this modified antigen, the results of the Wassermann reaction and the Sachs-Georgi test have agreed in more than 90 per cent. of cases. Whenever possible the patient's serum should be fresh; but sera some months old, preserved with chloroform, have given definite reactions. Moderate turbidity and blood-staining of the serum do not, as a rule, cause any difficulty in reading the result of the test. The preparation has been found unaltered after storage for over a year in a warm cupboard. It is supplied in 1 c.c. phials, with full instructions about the technique.

THE JAMES THERMOMETER SHEATH.

(London: Mr. A. E. James, 46, Harbut Road, S.W.11.)

Mr. A. E. James has invented a sheath for use with clinical thermometers. The only materials used are rice-paper, gum arabic, and fully refined paraffin wax. A sheath is slipped over the end of the thermometer before it is introduced into the mouth. The following advantages are claimed in its favour:—(1) Saving of time, because no cleansing of the thermometer after use is necessary: (2) Absolute cleanliness, because in withdrawing the thermometer nothing septic is touched by the hands; the sheath remains in the mouth, and is ejected by the patient: (3) A fresh sheath is used every time the thermometer is used: (4) In the case of breakage the broken parts remain in the sheath.

MOOGROL.

(London: Messrs. Burroughs, Wellcome & Co.,
Snow Hill Buildings, E.C.1.)

This is a mixture of the esters of acids of the chaulmoogric series. This new fatty acid series is the principal component of chaulmoogra oil and hydnocarpus oil. The treatment of leprosy by these esters has been largely used, and has shown good results. The most satisfactory method of administration has proved to be by intramuscular injections. "Moogrol" is a limpid oil, almost colourless, and has been found to be very suitable for injection. It is issued in bottles of 100 c.c., and circumstances have enabled the manufacturers to reduce the price to 30s. per bottle.

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Diabetes Mellitus.*

BY SIR W. H. WILLCOX, K.C.I.E., C.B., C.M.G.,
M.D., F.R.C.P.

*Physician to St. Mary's Hospital; Medical Adviser to the
Home Office, etc.*

THE subject of diabetes mellitus is one of such magnitude, and upon which such a large amount of important original research has been done during recent years that a long course of lectures would be required to deal adequately with so interesting and important a subject. Only a brief review can now be given and I shall attempt to give a *résumé* of the present position of our knowledge.

DEFINITION.

“Diabetes” is defined by Joslin as a disease in which the normal utilization of carbohydrate in the body is impaired, in consequence of which glucose is excreted in the urine. He says that he regards any patient with sugar in the urine demonstrable by any of the common tests as having diabetes mellitus until the contrary is proven. He thinks that the

* Lecture given at the North East London Post Graduate College. Specially revised for THE PRACTITIONER by the author.

term glycosuria begets indifference in the patient.

Diabetes mellitus is usually associated with an increase in the sugar content of the blood (hyperglycæmia), and sometimes with disturbance of the fat metabolism and resulting acidosis or ketosis.

Clinically there is no difficulty in recognizing a severe case. The wasting, polyuria, thirst and general weakness associated with the presence in the urine of sugar and often of acetone, diacetic acid, and oxybutyric acid form a characteristic feature. The very pale urine of high specific gravity is a striking feature of this type.

Cases of glycosuria vary enormously in character, and the general practitioner meets with the milder types of case much more frequently than the physician in his hospital practice for it is amongst the well to do that these occur. The stout, perhaps plethoric, patient (lipogenic diabetes) whose urine gives the common tests for sugar is often met with in general practice and the decision must be made is the case one of diabetes mellitus or transient glycosuria? In such a patient the urine can readily be rendered sugar free by methods of dieting and the power of utilization of carbohydrate should then be tested.

The assimilation limit is tested by giving 100 grammes of glucose in solution two hours after breakfast of a roll and butter with coffee. This meal should not be followed by glycosuria. In a severe case of diabetes, probably the full amount of the ingested glucose, or even more, will be excreted in the next 24 hours; and in the less severe forms an aliquot part of the 100 grammes of glucose, greater or smaller as the case may be, will be excreted.

It is well to regard a patient who fails to pass the assimilation test as suffering from diabetes mellitus. It is quite likely that, in the milder types of the

DIABETES MELLITUS

disease, the result of treatment will raise the assimilation limit, so that the patient subsequently will pass the test. He can then be regarded as a "glycosuric," but he should receive careful medical supervision subsequently, for such a one is apt to fall from his high estate and again to come under the category of "diabetic."

It is important to realize that the percentage of sugar in the urine is no criterion whatever of the type of case. High percentages of sugar are often found in the mild forms when the patient is seen for the first time and has had no dietetic treatment. I have seen 8 per cent. of sugar in a case of glycosuria in which, after slight treatment, the urine of the patient has become sugar-free when he was on a normal diet.

The milder types are generally recognized by the well-nourished and often fat or plethoric state of the patient, who has neither thirst nor polyuria but often suffers from some arterio-sclerosis and increase of blood-pressure—Pavy named these the alimentary type of diabetes. These patients may develop those signs of diabetes which are due to hyperglycæmia, such as neuritis, boils, carbuncles, etc. The urine is usually high-coloured, with often a trace of albumen and hyaline casts. A deposit of urates or uric acid may form on standing, and the sugar may reach a high percentage if no treatment has been adopted. Acetone or diacetic acid are usually absent, but may be present in small amounts.

There is an uncommon form of diabetes mellitus known as "diabetes innocens," where the patient passes sugar in the urine without having the usual symptoms of diabetes and where the quantity of sugar passed in the urine does not appear to be dependent on the amount of carbohydrate ingested. Dr. George Graham, in the Goulstonian Lectures, 1921, and

Dr. Langdon Brown, in the Croonian Lectures, 1919, both describe these forms of diabetes.

Two types of "diabetes innocens" occur. The commonest is associated with chronic nephritis of a mild type, and the urine contains albumen as well as sugar. Hyperglycæmia is usually absent, and the quantity of sugar in the urine is not related to the amount of carbohydrate ingested.

A less common type of case in which nephritis is absent has been described by Graham (*vide supra*). In this variety sugar occurs in fairly large amount in the urine, but the quantity is not dependent on the amount ingested and the usual symptoms of diabetes do not occur.

It is important to remember that sometimes cases of so-called "diabetes innocens" develop hyperglycæmia and the usual symptoms of severe diabetes. These cases should therefore be kept under observation, and the amount of carbohydrate ingested kept within moderate limits, avoiding sugar in the dietary.

ÆTIOLOGY.

Incidence.—Diabetes appears to be increasing in prevalence. Thus, in 1900, the death rate per 1,000,000 for England and Wales was 85, and there has been a steady rise up to 130 in 1915 and 1916. In 1918 and 1919 the death rate was 105. In the last Registrar-General's return for England and Wales the death rate from diabetes was, for males 110 and for females 100, and there has, during the past 20 years, been a consistently higher rate for males than females of about this proportion.

In 1919 the deaths from diabetes considerably exceeded in number those from such common diseases as appendicitis, enteric fever, cirrhosis of the liver.

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ENGLAND AND WALES.

CRUDE DEATH RATES PER MILLION.

Diabetes.

	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
M.	104	105	104	108	111	114	111	117
F.	84	91	91	97	98	106	103	105
P.	93	97	97	103	104	110	106	111
	1913.	1914.	1915.	1916.	1917.	1918.	1919.	
M.	120	126	142	150	133	126	110	
F.	116	118	120	114	96	90	100	
P.	118	122	130	130	112	105	105	

Race.—Diabetes is said to be commoner amongst the Hebrew race. Undoubtedly cases of the milder form (glycosuria) are much commoner amongst Hebrews, but from my own experience I do not think that the severe type of diabetes mellitus occurs more frequently amongst Hebrews. I am not aware of any reliable death rate statistics on this point.

PHYSIOLOGY.

Mono saccharoses formed from carbohydrate in the intestine are carried by the portal circulation to the liver and on the way are acted upon by the pancreatic enzymes or, as Allen puts it, the pancreatic amboceptor after which the sugar is stored as glycogen in the liver and muscles.

In diabetes there is deficiency of the pancreatic enzyme or amboceptor and the glucose passes as such into the blood stream and hyperglycæmia results. The normal percentage of glucose in the blood is $\cdot 06$ to $\cdot 11$ per cent. In diabetes the percentage is usually over $\cdot 11$ per cent., *e.g.*, from $\cdot 2$ to $\cdot 4$ per cent.

Internal Secretions have a profound influence on the carbohydrate metabolism.

Pancreas.—It is well known that the most important influence on the carbohydrate metabolism is the internal secretion of the pancreas. This is believed

to be produced by the cells known as the Islands of Langerhans and the internal secretion is conveyed by the pancreatic vein into the portal circulation. Allen calls the essential product of this "pancreatic amboceptor," and believes that this combines with the monosaccharose glucose to form a combination which can be stored up in the liver and muscles as glycogen. If through failure of pancreatic internal secretion this combination cannot be brought about then the sugar circulates as such in the blood stream and is excreted rapidly by the urine.

The external secretion of the pancreas has no influence on the carbohydrate metabolism. It might be thought that pancreatic preparation, either given by the alimentary tract or by injection into the blood stream, would be efficacious in the treatment. This is not the case, and all authorities are agreed as to the uselessness of pancreatic preparations in the control of diabetes. Joslin sums up his views of the value of the various pancreatic preparations which are placed upon the market and advertised as of great value in the treatment of diabetes by the terse statement "I do not use them."

Allen's conception of the action of the pancreatic internal secretion shows that if it is to be of value, it must be introduced into the portal circulation—but up to the present attempts to bring this about have failed. Pancreatic grafting, which I have seen done once with a fatal result, has proved unsuccessful, and this is not surprising owing to the powerful action of the trypsin and other ferments secreted.

The exact position of the pancreas in the causation of diabetes cannot be held to have been fully worked out. Its enormous importance is fully realized, but further investigations are required to establish fully the constant presence of histological lesions of the Islands of Langerhans in all cases of diabetes.

Osler mentions that in 15 autopsies on fatal cases

DIABETES MELLITUS

of diabetes nine only showed atrophy of the pancreas. Possibly in the remaining six special histological examination might have shown degenerative changes in the Islands of Langerhans.

Pituitary Gland.—The secretion of the posterior lobe passes into the third ventricle, and, if excessive, it may lower the assimilation limit for sugar and excite glycosuria, possibly by its action on the so-called diabetic centre in the medulla. Defect of posterior lobe secretion, as is often seen in disease or after removal of this portion of the gland, is followed by an increased tolerance for carbohydrates.

Thyroid Gland.—The secretion of this gland has an influence on the carbohydrate metabolism. Thus, excessive secretion, as occurs in Graves's disease, causes a lowered tolerance for sugar, and I have at present under my care at St. Mary's Hospital a case of exophthalmic goitre associated with typical diabetes and acetonuria. Glycosuria, though not uncommon in Graves's disease, is by no means a constant symptom, and it is difficult to explain why some cases should have it and others not.

In some patients the administration of thyroid extract may cause glycosuria.

The presence of glycosuria in acute myxoedema is a remarkable phenomenon and difficult to understand.

Suprarenals.—Injection of adrenalin may be followed by glycosuria, due, it is thought, to the peripheral action on the sympathetic system. The local application of adrenalin to the pancreas has a like effect.

Glycosuria does not occur in Addison's disease.

Liver.—It is remarkable that serious disease of this organ, described by Osler as "the great warehouse of the sugars," may exist without a trace of glycosuria.

In some cases of gall stones and of cirrhosis of the liver glycosuria occurs, and also it is a fairly constant symptom in Hæmochromatosis in which there is marked sclerosis of the liver, the so-called "bronzed

diabetes." In these conditions it is probable that the glycosuria results from involvement of the pancreas.

Nervous System.—Claude Bernard showed that injuries to the medulla (the so-called diabetic centre) are followed by glycosuria. This apparently results from its influence on the sympathetic system, and Dr. Langdon Brown, in the Croonian Lectures for 1919, gives an admirable account of the very important relation of the sympathetic nervous system of glycosuria.

Kidney.—Allusion has already been made to the association of glycosuria with certain cases of chronic nephritis. Albuminuria is not uncommon in severe diabetes due to the action of the sugar in the blood on the renal cells.

Phloridzin, if given by the mouth or subcutaneously, will cause glycosuria without any excess of sugar appearing in the blood. Phloridzin is a glucoside and appears to have a catalytic action in passing on glucose from the blood to the renal cells which excrete it.

Heredity.—Heredity plays an important part in the ætiology of diabetes. Several instances are on record of many cases occurring in one family.

In the acute pancreatic type of case more often no family history of the disease can be obtained.

Osler's series of 276 cases showed only 6 in which there was a history of disease in the relatives.

Naunym, in 201 private cases, found a history of diabetes in 35, while in only 7 out of 157 hospital cases was such obtained. This is in accordance with the view expressed above that hospital cases are usually of the more severe type in which a family history of diabetes is less common. Cases of diabetes occurring in husband and wife have been recorded.

Infectious Causes.—Sufficient stress has, I think, not been laid on the importance of these. A careful investigation into the history of cases of diabetes

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will often show that some acute illness has preceded the onset of diabetes. In mumps, for example, involvement of the pancreas is often followed by glycosuria.

I have seen cases of carbuncle with severe glycosuria, where the successful surgical treatment of the carbuncle has been rapidly followed by complete disappearance of the glycosuria and the assimilation limit for carbohydrate has become normal. In the laboratories of St. Mary's Hospital several cases of diabetes have been investigated bacteriologically, and in some abnormal intestinal infection has been found. Some years ago a few of these cases under my care were treated by inoculation with autogenous intestinal vaccine, but no appreciable benefit resulted from this line of treatment.

A case seen by me recently illustrates the importance of infection in the causation of diabetes.

The patient, aged 22, in January, 1918, had measles and scarlet fever. In June, 1918, "epidemic catarrhal jaundice." In September, 1918, a severe attack of "influenza." In October, 1918, noticed some thirst but did not mention this. In April, 1919, glycosuria was accidentally discovered, but in the absence of symptoms no attention was paid to this symptom. In February, 1921, it was found that severe diabetes of pancreatic type was present.

Recently a bacteriological examination of the stool, made by Dr. John Matthews, showed the presence of a large excess of pathogenic streptococci, and also the presence of a non-lectose fermenting bacillus, which tests showed to be Morgan's bacillus. It appears probable that in this case the repeated infections in 1918 had a profound effect on the Islands of Langerhans, and the intestinal infection persisting, made this degenerative effect progressive, so that, ultimately, a severe type of pancreatic diabetes resulted.

I believe that the cause of the pancreatic type of diabetes is in a large number of cases some toxic poison of bacterial nature acting directly or indirectly on the special pancreatic cells which control the carbohydrate metabolism, and I believe that latent intestinal bacterial infections are the cause of pan-

creatic diabetes in a large percentage of cases.

The occurrence of diabetes in some cases of syphilis is well known, and many cases of this kind have been recorded where effective treatment of the syphilitic infection has been followed by disappearance of the glycosuria.

SYMPTOMS OF DIABETES.

These may be classified into (A) those caused by the excess of sugar in the blood, hyperglycæmia; (B) Those due to the acidosis.

(A) *Hyperglycæmia*.—*Causes*.—Polydipsia (thirst), polyphagia (hunger), and polyuria, the dry tongue and scanty saliva. The skin affections such as pruritis, oils, carbuncles, eczema and susceptibility to staphylococcal infection, *arterio sclerosis* and resulting gangrene. Nervous symptoms such as peripheral neuritis and the abnormal mental symptoms. Cataract and diabetic retinitis. Impotence. Renal symptoms such as albuminuria and nephritis. An increase of the nitrogenous metabolism.

In the classical work of Allen evidence is recorded of the production experimentally of many of the above symptoms by the intravenous injections of glucose into animals.

Harley showed that the injection of glucose intravenously in dogs would produce acidosis, and he found in their blood acetone and diacetic acid.

The presence of hyperglycæmia appears to lower the resistance of the body to infections of various kinds, and diseases such as tonsillar infections, pneumonia, influenza, etc., are likely to run a severe and even fatal course. Pneumonia if not rapidly fatal is liable to be followed by gangrene of the lung.

(B) *Acidosis*.—Though as above mentioned this may be caused by hyperglycæmia in animals in cases of human diabetes the acidosis is undoubtedly the result of the excessive metabolism of firstly fat, and

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secondly protein, which occurs as a result of the failure to metabolize the carbohydrates absorbed from the alimentary tract.

The fat and protein are not completely broken down and as a result B oxybutyric acid, aceto acetic acid and acetone are formed and produce the symptoms of acidosis. It is likely that the aceto acetic acid and acetone in the blood are produced from the B oxybutyric acid first formed.

Recent work by Hartley has shown that the most important toxic agent in the causation of acidosis is the diacetic acid.

The symptoms of acidosis are well known, the initial symptoms of restlessness, weakness, giddiness, fainting, vomiting and air hunger should always be most carefully watched for since they are likely to be speedily followed by the characteristic stupor and coma associated with the characteristic marked increased deep breathing known as air hunger.

Cases in which diabetic coma has developed very rarely recover, instances have occurred in the practice of many of us where a temporary return to consciousness for a few hours has followed intravenous injections of normal saline with bicarbonate of soda, but I have never seen a case recover for a longer period. A very few cases of recovery have been recorded (Joslin).

TREATMENT.

It cannot be too strongly insisted upon that glycosuria when discovered in a patient for the first time should be regarded as a serious symptom requiring the fullest investigation.

Unless there is an obviously extraneous cause such as the grossest dietetic indiscretion, or the presence of some condition such as lactation which may account for it, the patient should be submitted to careful dietetic tests and his carbohydrate tolerance

determined.

The judgement of the practitioner on the individual case will determine the nature of the dietetic tests to be employed, but these should be carefully carried out, and in many cases the most careful supervision will be needed in order that these may be relied upon.

The treatment of diabetes has been revolutionized by Allen's classical researches and the essence of this treatment is dietetic. Allen has shown that the withholding of food in a few days results in the disappearance of sugar in the urine and that this is accompanied by a reduction in the products of acidosis, viz., oxybutyric acid, acetone and diacetic acid which also usually entirely disappear.

It may in a severe case be inadvisable to at once put the patient on to complete fasting, and as a preliminary the fat is removed entirely from the dietary, the protein much reduced and the carbohydrate gradually reduced to a modest figure.

Joslin has classified cases into :—

- severe*, with a carbohydrate tolerance of 0 to 10 grammes of carbohydrate;
- moderate*, with a carbohydrate tolerance of 10 to 50 grammes of carbohydrate;
- mild*, with a carbohydrate tolerance of over 50 grammes of carbohydrate.

Fasting days are now commenced, only coffee, tea (without milk or sugar), clear broth, and water as desired being allowed.

After a few days, usually not more than four, the urine becomes sugar free and then the dietary is gradually increased, vegetables being allowed which contain 5 per cent. of carbohydrate and the carbohydrate foods gradually increased until the carbohydrate tolerance is determined.

The urine will by this time probably be completely free from acetone and diacetic acid, as shown by Rothera's test.

A one or two-day fast will be necessary if sugar has

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appeared in the urine, and then the protein tolerance may be determined. This may be done by allowing a small amount of carbohydrate, about a quarter of the tolerance limit, and gradually increasing the protein by 20 grammes the first day and 15 grammes daily subsequently, up to 1 gramme per kilogramme body weight of the patient. The fat tolerance may be afterwards determined on similar lines, but this is not usually necessary.

If the patient is put on a diet of carbohydrate and protein well below his tolerance limits, the fat may be increased by amounts from 5 to 25 grammes daily, the signs of acidosis being carefully looked for by examination of the urine.

When the patient is receiving food equivalent to 30 calories per kilogramme body weight, the addition of fat should be withheld. On these lines a dietary may be arranged for the patient which will enable him to keep free from glycosuria.

Days of reduced diet or fasting are necessary. Thus, in a severe case a complete fast of one day a week is desirable. In mild cases the carbohydrate should be reduced on these days to one-half of the usual amount.

The details of the Allen treatment are concisely and admirably given by Joslin (*Treatment of Diabetes Mellitus*), and Osler gives an excellent summary.

Reference to these works will show the selection of articles of food which may comprise the dietary for the respective days.

After an investigation of the carbohydrate, protein and fat tolerance of a patient, a model dietary can be arranged so that his allowances are well within the tolerance limits, *e.g.*, about two-thirds is desirable. The patient should be taught to test his urine daily for sugar, and any reappearance should be followed by a fasting day. In severe diabetes a fasting day once a week is desirable. In less severe cases, fortnightly fasting day or weekly half-fasting day should

be observed.

Alcohol.—In most cases this is not required, and it is best avoided except in the severe cases where the carbohydrate tolerance is very low and acidosis is present. In such cases, 30 c.c. of alcohol, *i.e.*, about 60 c.c. of whisky (2 fluid ozs.), may be allowed per diem. This has a calorie value of 210.

Salt is of importance, and about 35 grammes per day of sodium chloride are required.

During the periods of fasting for several days, rest in bed or reclining is desirable.

During the past $2\frac{1}{2}$ years a number of cases of severe diabetes under my care at St. Mary's Hospital have been treated on the lines laid down by Allen, and the results have been most satisfactory.

I have tried modified forms of Allen's treatment, but in the severe types of case these have not proved so satisfactory as a rigid adherence to the system of treatment laid down by Allen and Joslin.

Complete rest in bed is not needed unless there is general weakness. Cheerful and hygienic surroundings and good climatic conditions are important.

The importance of the Allen treatment of diabetes is that, by removing hyperglycæmia most of the symptoms of the case disappear.

A further very important value of the treatment is that there is a possibility and in many cases a strong probability of the carbohydrate tolerance being much improved, whereas neglect of treatment means progressive lowering of the carbohydrate tolerance.

The bowels should be regularized by suitable mild aperients, *e.g.*, a Seidlitz powder every morning is very suitable.

Drugs are not needed unless there is a marked tendency to acidosis, when lactate and citrate of soda may be given in 40 grain doses of each three times a day. These drugs do not upset the gastric digestion and are very good neutralizers of the acids

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produced.

TREATMENT OF ACIDOSIS.

The most careful watch is needed for the early symptoms, and a special nurse is required for cases where there is threatening of this complication.

The bowels should be kept open by enemata, plenty of liquid should be taken by the mouth, *e.g.*, a litre every six hours. The fat first and then protein should be withdrawn from the dietary and the carbohydrate reduced to 1 gramme per kilo body weight given in the form of gruel and orange juice.

The carbohydrate is gradually reduced and complete fasting carried out until the sugar and acetone disappear from the urine.

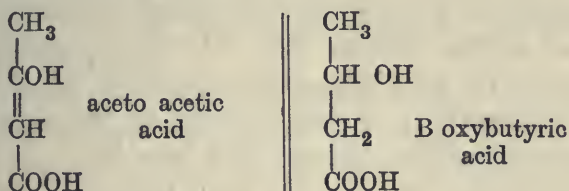
Where acidosis is threatening, saline may be given by the rectum or intravenously.

The question as to whether alkalies should be given has been much disputed and Joslin advises against their administration.

The work of Hartley on Acid Intoxication has shown that the toxic effects are due to the group



called the enolic group, *e.g.*—



which is present in aceto acetic acid, but not in B oxybutyric acid.

This group is not neutralized or effected by alkalies, so that sodium bicarbonate has no direct antidote effect on the toxic group.

The only value of giving alkalies in diabetes is

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for the purpose of neutralizing the B oxybutyric acid and aceto acetic acid and leaving more alkali for the purpose of carrying CO_2 in the blood.

Graham has found that when sodium bicarbonate was given in doses of 4 grammes per hour by mouth there was an increase of the CO_2 in the alveolar air from 4.4 to 5.5 per cent., and he advocates the use of alkalies for the acidosis of diabetes.

There was an increase in the aceto acetic acid output on the day in question.

I have always adopted the practice of giving alkali - producing remedies, *e.g.*, sodium lactate, citrate or bicarbonate in full doses where there is acidosis.

Where coma is threatening, two or three pints of intravenous saline may be given to which has been added 2 drachms of bicarbonate of soda to the pint.

A year ago Professor Collingwood, of St. Mary's Hospital, suggested to me the importance of determining the effect of the rectal administration of glucose solution in diabetes.

Careful experiments were made on 10 cases under my care at St. Mary's Hospital.

In each case the carbohydrate tolerance was carefully determined and the urine was sugar-free at the time the test was made.

Quantities of glucose solution, usually 80 grammes in 1 pint of normal saline, were introduced rectally and at two-hourly intervals, small portions of the fluid were withdrawn from the rectum in which a small clamped soft rubber catheter had been left.

The following results in five cases were obtained :—

E.A. the figures were as follows		10 a.m.	4.55 per cent. glucose
		12	3.42
		2	3.33
		4	3.08
E.W.	„	11 a.m.	4.42 per cent. glucose
		1 p.m.	3.84
		3 p.m.	3.38

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A.H. the figures were as follows		1 p.m.	8.33 per cent. glucose
		2.30	6.91
		3.30	6.58
		4.30	5.82
F.L.	„	2 p.m.	4.31
		4 p.m.	3.57
		6 p.m.	3.33
R.B.	„	1.30	6.76
		3.30	5.88
		5.30	4.98

The above figures show that the percentage of sugar diminishes by about 25 per cent. in the fluid in the rectum, and the quantity of liquid becomes less, since there is difficulty in obtaining samples after a few hours. It is a fair assumption that a considerable proportion of the glucose is absorbed. It might be said that some had been decomposed by organisms in the intestine, and that this would account for the fall in percentage. A like fall was found to occur if boric acid was added to the glucose solution, and as this has an antiseptic action, loss by fermentation can be ruled out as a complete explanation.

In none of my cases did any sugar appear in the urine.

This fact is very remarkable since the amount of sugar in every case given by rectum exceeded the limit of tolerance of the patient.

To prove that the sugar absorbed has been assimilated, tests on the respiratory quotient and metabolic rate are desirable.

The fact that glucose given rectally in diabetes does not cause glycosuria was first discovered by Arnheim in 1904, and since then numerous others have worked at the subject.

The fate of the glucose which disappears after rectal administration is a very interesting problem and may have an important bearing on the treatment of diabetes.

Some Points in the Surgery of the Right Iliac Fossa.*

By JOSEPH E. ADAMS, M.S., F.R.C.S.

*Surgeon to St. Thomas's Hospital, and to the East London Hospital
for Children.*

THE right iliac fossa is that part of the abdomen where the health of the patient is menaced most frequently, and certainly it is most frequently the seat of surgical activity. The reason why the surgeon must needs be so busy here is that many abdominal lesions, affecting other organs, are thought to have their origin in the appendix, the cæcum, or the ascending colon.

Moynihan is responsible for saying that many a gastric ulcer is situated in the right iliac fossa, and some writers would have us believe that all the ills of the upper abdomen have a beginning in the lower zones of this complicated cavity.

In directing attention first to some of the surgical questions of appendicitis I do not propose to dwell at any length on the clinical aspect. The ordinary type of attack is so well known that in a large proportion of cases the patient diagnoses, and diagnoses correctly, his own disease. That various forms of dyspepsia, with perhaps ill-defined characters, in one patient simulating gastric ulcer, in another duodenal, may cease from the day that the appendix is removed is also old history. But the oft-recurring question of when to operate in appendicitis

* Paper read before the South Essex Branch of the British Medical Association.

still presents some scope for profitable consideration. One point has been conceded by all disputants, namely, that if you catch cases within twenty-four hours of the onset of an acute attack, be it the first or the tenth, immediate operation should be performed. The impossibly illogical attitude of awaiting a second attack before urging the need of operation may easily mean giving a preference to the undertaker rather than to the surgeon. When once it is certain that acute appendicitis is present, it is quite impossible to say whether the disease will progress or retrogress; whether gangrene of the outer coats and perforation will occur, or whether drainage of the inflammatory contents will take place into the cæcum.

Operation at this early period of attack may, perhaps, have a mortality, indeed, no abdominal operation can be conducted without some risk to life, but in the hands of all surgeons it is no higher than that of the interval operation, and this is only a fraction of 1 per cent. The anæsthetic is probably as often responsible as the operation itself, and the technical details matter very little provided that the operation is carried out speedily; rarely, indeed, is any drainage of the peritoneal cavity necessary or desirable. If we concede this point, there are three others of equal importance and greater difficulty. What should be done in early cases in which the diagnosis is not clear, and the medical attendant does not feel impelled to urge immediate operation? Secondly, what is the appropriate treatment for cases encountered after the second day of the disease? Lastly, is there any scope for the medical treatment of appendicitis?

The answer to the first question may, I think, be summed up in three orders: the Fowler position; starvation; no aperients.

The virtue of the Fowler position rests on the well-known fact that of all parts of the peritoneum

the pelvic portion is most tolerant of infection. Here the co-efficient of absorption is low, and pelvic peritonitis is much less serious than inflammation affecting the upper regions of the abdominal cavity. Therefore a patient nursed in the sitting position, even if an infective focus is present and the infection spreads, will suffer from a less serious degree of peritonitis, since gravity plays a considerable part in the extension of peritoneal infection. Nor does the patient object to this attitude, for it secures relaxation of the muscles of the abdominal wall, and painful spasm of these muscles is a part, at least, of the discomfort of abdominal pain, from whatever cause it may be due. The maintenance of the Fowler position is sometimes troublesome, and it may be necessary to pile as many as six pillows behind the patient's back in addition to the hard bolster beneath the thighs. Most hospitals are provided with special beds which are adjustable so that this position can be maintained without masses of pillows, and thus the washing bill of the institution is kept within reasonable limits.

Starvation is not a prospect which alarms the individual suffering from abdominal pain. Appetite is usually in abeyance, and if the attack is not the first of its kind, he will probably know that food tends to aggravate the pain. Much of our food is consumed from a sense of duty, but the patient who puts himself on a nauseous and dilating diet of milk and soda water is happily not often met with now. Food is readily foregone, but thirst is sometimes clamorous, and water may be permitted in small quantities. If it is to quench thirst, it should be cold. If a nurse is in attendance, there is no doubt that rectal saline is a preferable method of allaying thirst.

The abuse of aperients in appendicitis has been responsible for many deaths. It is true that mucus and débris from the appendix may be passed into

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the cæcum if peristalsis is active, and thus true catarrhal appendicitis may terminate; but since the pathological condition of the appendix bears very indefinite relation to the clinical signs of the disease, it is easy to understand that peristalsis, in an acutely inflamed portion of bowel, may easily lead to perforation and widespread infection. The "safety first" principle, then, in appendicitis is inhibition of peristalsis. This might appear to justify the use of opium, or morphia, but here the drawbacks outweigh the advantages, and sufficient peristaltic quiescence can be secured by the avoidance of food and aperients. Pain must be relieved, and this can usually be effected by dry heat or hot fomentations, applied to the abdominal wall. Morphia will obscure the diagnosis, and diagnosis is the essential step to the right line of treatment.

How long may legitimately be devoted to this period of watching and waiting? The answer is twenty-four hours. In abdominal disturbances due to dietetic error, in attacks of colic and minor abdominal ills, the symptoms are almost certain to subside under this *régime* in such a period. If the bill is a true one, the physical signs of localized tenderness in the right iliac fossa, with muscular rigidity, cutaneous hyperæsthesia, rise of pulse-rate and temperature, are almost equally certain to have become so evident that the diagnosis remains no longer in doubt. Spread of the infection to the peritoneum will probably cause increased local and general pain, furring of the tongue, and anxiety in the facial expression of the patient.

We now come to a consideration of those cases in which the diagnosis is clear, but the so-called safe period has passed, and the precise condition of the appendix and its adnexa is a matter of conjecture. Personally, I am not prepared to admit that any

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definite time can be set to the period of safety. I would rather say that it is only possible to conjecture whether the disease is still limited to the appendix, or whether it has spread to the surrounding peritoneum. The symptoms at the onset of an attack may be, as I have already stated, vague and uncertain. Even the patient may not recognize that he is out of health and many a "fourth day" appendix may have been inflamed for a week. Even if we admit, as we must certainly do, that inflammatory masses may be absorbed, and that pus may be drained into the cæcum, we must recognize the uncertainty of these happenings. We must also confess that such terminations of one attack do not confer immunity against recurrence. The successful medical treatment, then, of one attack does not protect the patient against the danger of an operation in what is termed the quiescent period, and it condemns him to at least two illnesses, one to be treated by the physician, the other by the surgeon. As the result of experience of large numbers of cases, bitter in the old days, but now, I think, happy by comparison, nearly all surgeons will subscribe to the doctrine of operating as soon as the diagnosis is made. It is also generally accepted amongst the lay public. Only the other day I heard two men in a club talking on this subject, and one told the other that his father had died of appendicitis in India in 1894. He added that he was operated on, but too late to save him, and that nowadays this would not have occurred. That case was no doubt "cooked," as the hospital expression of the day has it. Have the public ever complained that their relatives with appendicitis have been operated on too early?

The question uppermost in the surgeon's mind is the nature of the operation which should be performed in any particular case. Obviously, if the disease is

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limited to the appendix, its removal is all that is required. If there is a well-defined abscess, which can be opened without traversing the peritoneal cavity, incision and drainage, with subsequent appendicectomy, is the treatment commonly adopted, and with success. An inflammatory mass with little or no pus does call for the nicest surgical discrimination, but the safest plan is to do nothing more than insert a tube leading down to the inflammatory mass. Subsidence is usually rapid, with or without the discharge of pus, and appendicectomy can be performed some six weeks after the wound has healed. In those cases in which local or diffuse peritonitis is present as a complication of appendicitis the prime source of evil should be removed, removed quickly, and the peritoneum cleaned up by dry-sponging. The time which the operation takes has a direct bearing on the prognosis, and the old advice, attributed to Murphy, "get in quick and get out quicker," represents the high-water mark of sagacity in the surgery of the appendix. Such an operation is a severe auto-inoculation to the patient and the danger of prolonged anæsthesia cannot easily be over-emphasized. Every operation for acute appendicitis should be brief, the briefer the better, and the security of the appendix stump is almost as assured with a single ligature as by careful burying with a row of sutures.

ILEO-CÆCAL TUBERCULOSIS.

It is a remarkable fact that whilst tuberculous ulceration of the intestine is frequently met with, this portion of the intestinal canal is the only one where hyperplastic tuberculosis, that is, overgrowth of tuberculous granulation tissue with tumour formation, is at all common.

A certain number of these cases have been regarded as unusual forms of appendicitis of non-tuberculous

origin, or as malignant disease of the cæcum. Herein lies the importance of the differential diagnosis, for the necessary treatment is very different from that of appendicitis, and the prognosis is certainly not that of malignant disease.

The bovine origin of intestinal tuberculosis is theoretically attractive, but the lesion apparently occurs most often as a secondary manifestation of tuberculosis; the commonest age-period is between 20 and 40, and the majority of the patients have a focus of disease elsewhere, usually in the lungs. This, however, is not pronounced, and would often be overlooked were not the true nature of the intestinal infection suspected. Pathologically, there are two types of ileo-cæcal tuberculosis, the subserous and submucous. Inflammation and hyperplasia occur beneath the outer or inner coats of the bowel, and in the subserous variety it is probable that extension may occur from infected glands in the ileo-cæcal angle. In either case the muscular coat appears to resist the infection for a considerable period, and in neither form is there any decided tendency for the multiple coalescing tubercles to break down and form tuberculous abscesses. This does occasionally occur, but the commoner phenomenon is the formation of a tumour, often mobile and comparatively painless, leading slowly to constriction of the intestinal lumen, and producing obstructive signs, though rarely of an acute nature. Sometimes the cæcum, sometimes the ileum, is the more involved, but there is little tendency for the disease to spread to other parts of the intestine.

Symptoms.—These patients are usually ill-nourished, and the symptoms are those of intestinal stenosis. Increasing constipation, with colicky attacks of pain, visible peristalsis, occasional vomiting, and persistent discomfort in the right iliac fossa are the prominent

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features of the disease. Diarrhoea is sometimes met with as in other forms of large bowel stenosis, but the obstruction is seldom complete. Such diarrhoea, if present, is attributable to tuberculous ulceration rather than to mere catarrh on the proximal side of the stenosing lesion. Blood is rarely seen in the stools, and, if passed at all, it is never abundant. Sooner or later a tumour is discovered, not infrequently by the patient. It is usually firm, nodular, and it may be visible through the abdominal wall. In shape it is often cylindrical, corresponding to the outline of the descending colon. When the ileum is involved, the tumour is apt to be transverse. Mobility and only slight tenderness are important characteristics, and it does not move on respiration. Occasionally the fingers can almost be passed behind it and pick it up. On percussion over the mass, diminished resonance may be demonstrated.

As the disease progresses, mobility gives place to fixity. The neighbouring glands and mesenteries become involved, the tumour increases in size and may gain adherence to the anterior abdominal wall. It is this stage of ileo-cæcal tuberculosis which may closely resemble either appendicitis with abscess formation or carcinoma, according to the length of the history which the patient gives—a history which is often incorrect. Abscess formation does occur, and discharge of pus and faecal matter may take place through the abdominal wall, or into the adjacent bowel, the bladder, or the vagina. Fever is slight in degree unless an abscess is present.

The length of the illness is very variable. In some cases the disease may persist for years, and the patient slowly goes downhill unless treated surgically. The fatal termination is more likely to be due to dissemination of tuberculosis than to intestinal obstruction. A secondary peritonitis or cellulitis may, however,

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determine a fatal issue.

Treatment.—If the condition of the patient permits it, resection of the lower end of the ileum together with part, or the whole, of the ascending colon is indicated. The continuity of the bowel should be secured by ileo-colic anastomosis, either end-to-side, lateral, or end-to-end junction being effected according to the preference of the surgeon. This may be rather a severe operation, but the results in young patients are so good that some risk may legitimately be taken.

Some years ago, I performed such a resection for a girl in the twenties who had been ill for about 12 months with what was supposed to be chronic appendicitis. She was about to be married, and had no signs of active disease in the chest. This abdominal condition was her one bar to matrimony. I resected the ascending colon together with the lower ten inches of the ileum and implanted the end of the ileum into the side of the transverse colon. Her recovery was striking; her complexion immediately began to improve, she put on weight, and not long afterwards she married, and has since had two healthy children. I heard only the other day that she is in excellent health.

It is not every one of the patients who will stand a severe operation; it may be from inability to stand prolonged anæsthesia owing to deposits in the lungs; it may be from the weakness of prolonged intoxication due to partial obstruction. We must, then, in certain cases, be content with a palliative operation, *i.e.*, anastomosis to relieve, or prevent, intestinal obstruction. The immediate improvement may be, and often is, satisfactory, but the diseased area tends to increase and abscess formation with fistulæ is likely to ensue.

CARCINOMA OF THE CÆCUM.

Of all abdominal cancer probably that arising in the cæcum, if we except a rare variety of primary carcinoma of the appendix, has the best prognosis. This is explained by several facts, one of which is that any patient suffering from discomfort in the right iliac fossa is apt to consult a medical man, under the impression that every trouble in this region

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is appendicitis. In addition to this, a tumour affecting the cæcum remains moveable longer than most intestinal cancers, and this situation favours an operation planned in accordance with the surgical rules for operating on malignant disease. The tumour, healthy tissue around it, and the lymphatics which drain it can easily be removed *en masse*. We are thus able to paint a much better picture of malignant disease here than in any other portion of the intestine, possibly even including the rectum. I have mentioned primary carcinoma of the appendix, but this is one of those surgical curiosities which, without the aid of the microscope, would hardly be recognized as an example of malignant disease.

I do mention it, however, because it so happens that I removed such an appendix from a girl, aged twelve, in January, 1919, and I am watching her progress with much interest. So far she is in perfect health. I have knowledge of one other case perfectly well thirteen years after the operation.

Carcinoma of the cæcum is less common than cancer of the rectum or pelvic colon, but this portion of the large bowel is affected more often than either the hepatic or splenic flexures. So much for the theory of chronic irritation due to the presence of hardened faeces at the flexures as a leading cause of cancer. Anatomically, the disease may originate in the ileo-cæcal valve or the ascending colon, but the lesion is loosely referred to as carcinoma of the cæcum, and the cæcum is undoubtedly one of the sites of normal intestinal delay.

To illustrate the clinical aspect of the more favourable type of this lesion I propose to give the details of a case on which I operated in 1914:—

The patient was a clergyman aged 61. He had been operated on for piles some years previously, and for eighteen months had suffered from discomfort in the right iliac fossa. He had been troubled to some extent with constipation, and had lost weight fairly rapidly in the early part of 1914. On examination, I found a very hard mass rather high up in the right iliac fossa, moveable both up and down, and from side to side. The abdomen was not

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distended, and apart from very evident loss of weight the general condition of the patient was good. The hardness of the tumour made one suspect malignancy, but I reassured the patient by telling him that it appeared to be inflammatory, and I thought we could take it all away. This proved to be rather more difficult than I had anticipated, and the glands in the mesentery between the ileum and colon were much enlarged. However, the cæcum and ascending colon were mobilized by division of the peritoneum on the outer aspect of the bowel; the mass was delivered through the abdominal wound, and the ileum divided four inches from the ileo-cæcal valve. It was then possible to strip up the bowel, mesentery, and glands so that the duodenum was laid bare, after the technique of Freidrich's operation, and the ileum was implanted into the side of the transverse colon. The patient made a good recovery, and I have recently heard from Dr. Gray, of Hindhead, that he is in excellent health.

In this case, the carcinoma began at the junction of the cæcum and ascending colon; it was an annular growth causing pronounced invasion of the glands in the neighbourhood.

Not all cases of cæcal cancer run such a comparatively benign course, and the greatest difficulty arises when the growth is complicated by acute obstruction. This sequel is, perhaps, more often due to infiltration of the surrounding tissues and fixity of the growth than to actual constriction of the lumen to an impassable degree. The fæces here are fluid, therefore kinking or distortion of the intestine is required to make the obstruction absolute. When this does occur the consequences are most serious, for the cæcum is always the seat of great bacterial activity, and the decomposition products are highly toxic. This fact militates against successful surgical relief, for the ileum must be drained, either on to the surface of the abdominal wall or into a low part of the descending colon. A simple ileostomy not infrequently fails, and the patient may die from toxæmia although the obstruction is relieved; this, I have observed several times owing to the quantity of toxic material which may be locked up in a dilated cæcum between the valve and the actual obstruction.

An ileostomy, too, is apt to lead to rapid excoriation of the skin, painful and distressing to the patient, and a handicap to the surgeon if secondary operative procedures are contemplated for removal of the growth. On the whole, I believe the best treatment for acute obstruction due to cancer of the cæcum and its neighbourhood consists in division of the ileum, implantation of its proximal end into the adjacent pelvic colon, with fixation of the distal end in the wound and drainage by means of a tube passed into the cæcum. The fæcal stream will be diverted by the anastomosis; the toxicity of the intestinal contents will be lessened by the drainage tube. In favourable cases drainage here will cease after a few days, and the fistula may close spontaneously.

CÆCOPTOSIS.

I have already stated that many authorities look for the origin of the ills of the upper abdomen in the neighbourhood of the right iliac fossa. A mobile and dilated cæcum was held to blame by Wilms,¹ in 1908, for many of the otherwise unexplained cases of dyspepsia, abdominal pain, and attacks suggestive even of biliary colic. Jackson² in the same year ascribed similar symptoms to the presence of an abnormal membrane passing from the anterior aspect of the colon to the abdominal wall, associated with undue mobility of the cæcum. Other writers, notably Waugh,³ have extended the indictment to the ascending colon. Walton,⁴ in 1915, drew attention to the fact that, whereas in the early days of abdominal exploration the surgeon often closed the abdomen without finding any abnormality, this negative procedure is now much less common. Then the surgeon was even keener than he is to-day to look and see, but he did not always know what to look for. Nowadays he justifies his operation by the repair of various

examples of visceroptosis, and there have been corresponding improvements in the results of such operations. Lane was, perhaps, the first to emphasize the evil that man had inherited by reason of the upright position of the body, and whether we speak of ileal stasis, alimentary toxæmia, or intestinal auto-intoxication, it is probable that some variety of visceroptosis is at the bottom of it.

It is clearly a disadvantage to the patient if propulsion of his fæcal contents is handicapped at any point, and, if the cæcum occupies a low position in the pelvis, there is a probability that it will become distended with gas and the ileal effluent may be delayed; this will be aggravated if the cæcum is unduly mobile and has a tendency towards volvulus. The ascending colon, too, that portion of bowel which succeeds the cæcum, has peculiar difficulties in carrying out its function in an upright man. It is the only part of the intestinal tract which runs uphill all the way. Even the distal half of the transverse colon has only an upward slope, but the first part of the large bowel must harbour fæces which are gradually becoming dry and solid, and it must propel these against the force of gravity. The intestinal evils of man then start from the day when he ceases to crawl, and his proud erect position brings with it responsibilities which may lead to his digestive downfall.

Visceroptosis is now regarded as a hydra-headed disease. The abdomen contains a large number of organs, and it is generally conceded that the main factor in keeping them in their proper place is adequate intra-abdominal pressure. This probably depends upon the tone of the muscles of the abdominal wall more than anything else, and the function of mesenteries is not to support organs but to nourish them with blood and supply them with nerves, motor,

sensory, and sympathetic. The proof that any particular group of symptoms, met with in the subjects of visceroptosis, is due to the displacement of any individual viscus depends on the discovery of this lesion and the complete relief of symptoms by the indicated readjustment, or fixation. Another factor, which has not received all the attention it deserves from the mechanically minded surgeon, is the influence of the nervous system over intestinal activity. It must be acknowledged that cases of long-standing constipation have been cured both by auto- and hetero-suggestion. Is it possible that strength of will can overcome intestinal kinks and prolapses? These themselves may cause traction on mesenteries and pressure on the autonomic nerve-fibres which control essential visceral impulses, therefore kinks and prolapses should be readjusted in order that psychical treatment may have a good chance of success.

The symptoms attributable to visceroptosis in general and cæcoptosis in particular, are often suggestive of gastric or duodenal ulceration, acute or chronic appendicitis, and even cholelithiasis. Abnormal mobility of the cæcum is held responsible for many varieties of right-sided abdominal pain, and it is possible that ptosis of the cæcum and ascending colon may play some part in the ætiology of both peptic ulcer and gall-stones. It may, perhaps, be admitted that visceroptosis is in certain cases responsible for the prodromal symptoms, but it is certainly not necessary for gastropptosis to precede gastric ulceration, and by many it is held that upper abdominal lesions are often due in the first place to displacements of lower abdominal viscera. Without seeking to labour these points, since they are matters of controversy and the time has not yet arrived when we know enough about our end-results, I would like to draw attention to two points, namely,

the use of the abdominal belt and the operation of colopexy.

If the abdominal wall is weak and lax, the abdominal viscera necessarily lose some of their natural support. Our sedentary town life, with its lack of exercise, its late hours, its overfeeding, tends to the deterioration of the musculature of the abdominal wall. This may be counteracted by the daily performance of special exercises devised to strengthen the trunk muscles. The weakness may also be counteracted by the habitual use of an abdominal belt. Women's corsets do protect their viscera, but these corsets are often ill-designed, and, if they are close-fitting above and loose below, they may actually favour the prolapse of the abdominal organs. The liver of the tight-laced is rarely seen in the *post-mortem* room now, but the modern woman, comparatively corsetless, has gone a bit too far, unless she maintains the tone of her abdominal muscles by exercise.

That the indigestion of visceroptosis, with abnormal mobility of the cæcum, can be cured with a well-fitting abdominal belt is illustrated by a case under my care some years ago :—

The patient was a woman of about thirty-seven who came to me first in 1914, having had four definite attacks of appendicitis and many less severe ones. The first was in 1908, the last major attack in 1913. She had a good deal of indigestion, and was markedly constipated during the attacks. Her appendix I removed at the end of 1914. It was adherent to the back of a mobile cæcum, and strictured in two places. She remained in fairly good health for five years, troubled only with indigestion, amounting to spasmodic pain, not localizable, with long periods of intermission. In December, 1919, she consulted me again, and her history was suggestive of duodenal ulcer. A test meal revealed a low acidity of the gastric contents, the total HCl was .070 per cent. A bismuth meal showed that the stomach emptied in two and a half hours, and there was prolapse of the large intestine. A belt with a low pad to exercise upward pressure on the lower abdomen was made for her, and she has worn this in addition to her corsets ever since. In December last I received a letter from her from Japan, stating that she is far better than she has been for many years. She has no indigestion, and can walk twenty

miles in a day.

But belts do not always succeed, and the art of the surgeon may be required to anchor displaced viscera, usually to the posterior abdominal wall. The difficulty in operating for visceroptosis is to select the right organs for fixation, to know what kinks to undo, to recognize the things that matter. If the fault were always with the cæcum and first part of the large intestine, ascending colopexy would become an ideal operation. But Rovsing, the celebrated surgeon of Copenhagen, cures gastropexy, and his patients, by gastropexy; Coffey has advised anchorage of the great omentum and the transverse meso-colon to the anterior abdominal wall to support both the colon and the stomach; Lane has directed his attention to the relief of kinks which he regards as evidences of visceroptosis, or Nature's prevention of it; Jackson advised the removal of the membrane which sometimes covers the front of the cæcum, and kinks it. The whole question is complex and it resembles the controversies of the early Christian Church. Whether we elect to follow Paul or Apollos among the surgeons of to-day, our object should be to cure our patients, and to do it by operation in visceroptosis we must effect the right kind of "pexy" in any given case. Ascending colopexy does appear to be a suitable operation for right-sided symptoms, but oftentimes it should be combined with plastic division of kinking bands; the appendix should be removed, and a clear run from the ileum to the cæcum must be provided for.

I will conclude with some details of a case on which I operated recently, in which the symptoms pointed to cholelithiasis :—

The patient was a single woman of forty-six, and I was first consulted by her in April, 1919. She had jaundice fifteen years before this, and in 1918 she had a severe attack of abdominal pain which was thought to be due to gall-stones by two competent

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medical practitioners. There was no jaundice in this attack. From this time until 1920 she had frequent bilious attacks and persistent indigestion. A Curtis belt was ordered by a surgeon who was consulted, and she was advised to take regular doses of paraffin. I concurred in this line of treatment when I saw the patient, because I found well-marked evidence of dilatation and displacement of the cæcum; and the attack for which I was consulted resembled appendicitis rather than a gall-stone attack. A year's trial of this treatment disappointed us all, and I therefore explored the abdomen. The appendix was slightly twisted and fibrotic, but empty, and healthy as to its mucous coat. The cæcum and ascending colon were very mobile, with an almost complete mesentery to the ascending colon, and an ill-defined hepatic flexure, low in position. There was no obvious drag on the duodenum. There was no Lane's band, but a small Jackson's membrane was present. The gall-bladder was normal and the bile ducts free. There was no ulcer of the stomach or duodenum. The right kidney was a little lower than it should be. I removed the appendix and performed an ascending colopexy with fixation of both the hepatic flexure and the cæcum. A new type of corset belt was worn after the operation, and steady progress has been made ever since. I heard from the patient only a few weeks ago, and she tells me that her appetite has returned and the only real trouble is constipation, which is controlled by paraffin and phenol-phthalein. Such an operation is obviously too recent to express a definite opinion about, but so far the result is encouraging.

By recording successes I do not mean to deny failures, and failures I have had both from belts and operation and from fixation followed by the use of a belt. When we understand the reason of these failures we may achieve the cure of all the patients. It may be urged in defence of the surgical failures that the patient is usually one who would justifiably be called neurotic, whose mind is fixed too much on things intestinal. On the other side of the balance sheet I may record the case of an officer, whom I rescued during the war from being shut up in a mental hospital by the simple procedure of removing his appendix and a Jackson's membrane.

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The Treatment of Cardiospasm.

By N. MUTCH, M.A., M.D., F.R.C.P.

Assistant Physician to Guy's Hospital, etc.

THE earliest accounts of this condition are probably those of Von Ziemssen and Zenker, who in 1874 described cases of idiopathic dilatation of the œsophagus, which had been seen at post-mortem examinations. Some years later, Mikulicz suggested that persistent or excessive action of the cardiac sphincter of the stomach was the direct cause of the dilatation, and so introduced the term "Cardiospasm," by which the condition is now known. In more recent times, valuable contributions have been made by H. S. Plummer, working at the Mayo Clinic in America.

The outstanding feature of the disease is the failure of the lower end of the œsophagus to consummate the act of deglutition. The voluntary movements of swallowing and the reflex peristalsis of the upper part of the œsophagus propel the food towards the stomach but, through a defect in the neuromuscular mechanism at the lower end of the œsophagus, the food stops at the level of the diaphragm and does not enter the stomach, although a large bougie or a finger can be pushed through the cardiac orifice without the slightest difficulty. The immediate result is vomiting. After a time dilatation of the œsophagus and muscular hypertrophy take place, until the cavity may be large enough to hold more than a pint of fluid.

The cause of the condition is obscure. It cannot be classified as a manifestation of hysteria, and critical case-histories rarely reveal a neurotic temperament

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before the onset of the trouble. In about a tenth of the cases, there is coincident disease of a gross nature in the stomach, such as cancer or chronic ulceration. This suggests a close relationship between cardio-spasm and disorders of the lower part of the alimentary tract. It may be a pathological exaggeration of a protective reflex, and thus be akin to the nausea, gastric inertia, and vomiting which prevent ingress of food into the small intestine in such conditions as appendicitis or obstruction of the ileum.

Its clinical course has been divided into three stages. The first symptom is intermittent discomfort at meal times referred to the upper part of the epigastrium or to the lower part of the sternum. The discomfort rarely amounts to acute pain, and represents either initial irritation of the lower end of the œsophagus or overaction of the muscle coats of this portion of the gullet.

The chief feature of the second stage is precipitate vomiting during the course of a meal, and often after only a very small amount of food has been swallowed. The symptom is intermittent and, having appeared for several days, may subside and recur after an indefinite period of days, weeks or months. During the attacks the food fails to reach the stomach and, the œsophagus being unaccustomed to the retention of food, rejects it after each act of deglutition.

The œsophagus gradually becomes more tolerant, and in the third stage food is retained for longer periods. During this stage progressive dilatation and hypertrophy occur, and, although vomiting is not so precipitate, the health of the patient deteriorates more rapidly. In this stage the œsophagus is probably never completely empty. The lower part of the gullet becomes so distended as to simulate a second stomach. A wide cavity replaces what normally is merely a potential tube. Peristalsis has no power over the contents of this sac, and the

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only means of forcing an opening into the stomach is through the hydrostatic pressure of the accumulating food, aided by such rise in tension as can be effected in the cavity by forcible swallowing or the movements of respiration. When the pressure at the cardiac sphincter becomes sufficient, the food passes into the stomach in a gush, and the patient experiences temporary relief.

The process can be seen clearly by means of radioscopy. In Fig. 1 are shown reduced tracings

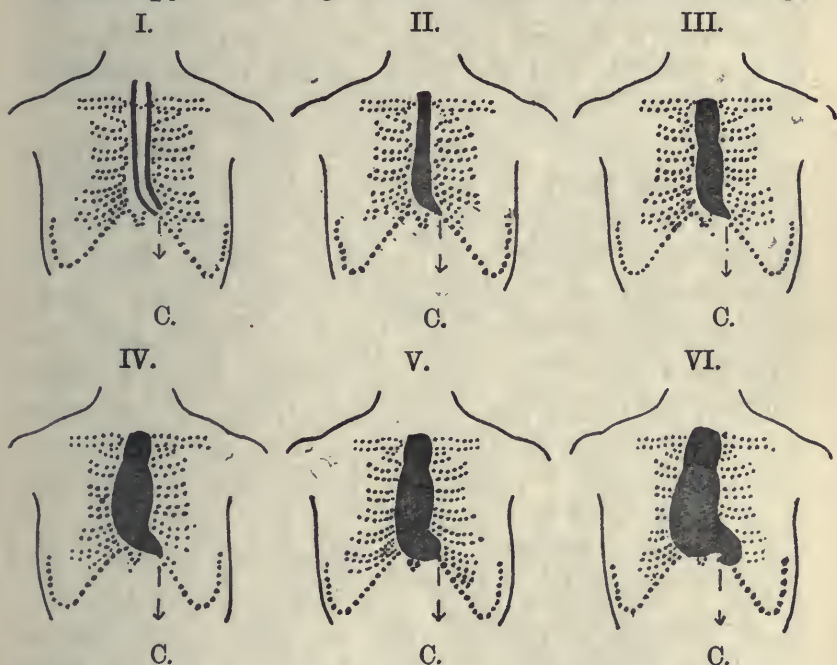


FIG. 1.—Reduced tracings of radiograms of the œsophagus, showing the progressive changes produced by cardiospasm. In each case the cardiac orifice is indicated by the letter "C." I.—Normal œsophagus. II.—Slight dilatation. III.—Moderate dilatation. IV.—Severe dilatation. V.—Dilatation with pouching. (The cardiac orifice is no longer at the lowest point of the œsophageal shadow.) VI.—Dilatation with severe pouching. (There is a pouch on each side of the vertebral column. That to the left sags beyond the cardiac orifice and the longitudinal axis of the œsophagus follows an S shaped course.)

from radiograms taken during the various phases of Stage 3. At first, the œsophagus is dilated in

its lower part only, but eventually is involved throughout the whole of its course. The zone of obstruction appears as a narrow channel at the level of the diaphragm. The œsophagus immediately above this point is in the form of a smooth-walled funnel. As the process continues, pouching takes place until, as in IV., V., VI., the cardiac opening comes to lie considerably to the left of the vertical axis of the œsophagus. After a time the pouch sags backwards on the right side of the vertebral column as in VI., a second portion pouches on the left side of the column, and the track leading to the stomach becomes very sinuous and difficult to find.

Many methods of treatment have been tried. Bougies can easily be passed into the stomach when there is no lateral pouching, and at all stages a sealed rubber tube loaded with mercury readily finds its way through the œsophagus. A few hours' relief may follow such treatment, but I have seen patients who have passed the mercury tube 35 times a week without obtaining any permanent relief. A sedative diet is of service in Stage 1, but does not succeed in the later stages. Distress is diminished for just so long as the diet is continued, but the resumption of ordinary food is followed by immediate relapse. In Stage 3, suggestion helps the patient to retain the food for longer periods, and sometimes diminishes vomiting considerably. The disorder is in this way masked rather than relieved. The difficulty at the cardiac orifice remains, and, with increased retention of food, dilatation and hypertrophy develop with even greater rapidity. Many drugs have been tried. Atropine appears to aggravate rather than relieve the trouble. The vagus supplies inhibitory nerves to the cardiac sphincter, and atropine, by paralysing these nerve endings, makes relaxation even more difficult than before. Pilocarpine might be of service,

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but the vomiting reflex is so unduly sensitive in these patients that an exaggerated motor effect on the stomach accompanies inhibition of the cardiac sphincter, and frequently causes vomiting.

Many other drugs have been tried from time to time, but, in the fully developed disease, permanent and complete relief can only be obtained by paralytic dilatation of the cardiac sphincter. Stretching must be so severe as to paralyse the muscle temporarily, much in the same manner as temporary paralysis of the sphincter ani is secured by stretching in the treatment of certain diseases of the rectum. The earliest attempts to accomplish this were made from below the diaphragm at laparotomy. The best method, however, is to introduce a rubber bag into the upper orifice of the stomach and then distend it until the sphincter has been sufficiently stretched. A gum-elastic oesophageal tube is used, which is closed at the lower end, but perforated laterally two or three inches above the point. Over these holes a rubber bag is fitted, and is prevented from over-distension by a stout silk fabric incorporated in its walls. At low tensions the bag is narrower in the middle than at the end, so that it does not tend to slip out of position after it has been inserted through the cardiac orifice. (Fig. 2, page 344.) At higher tensions, it becomes widest in the middle, and so exerts its greatest distending action at this point. At the upper end of the tube a small stopcock is fitted. At the lower end is a metal olive pierced for the reception of a silk guide. Water is chosen as the distending medium because, at the pressure used, its volume remains constant. In the event of the bag breaking, no explosive force is brought to bear on the oesophagus such as would follow the rupture of a bag of compressed air. The pressure at which the bag is distended is a measure of the force applied to the

sphincter, and is carefully regulated. It is usually rather less than one atmosphere. The most convenient source of pressure is that introduced by Plummer,

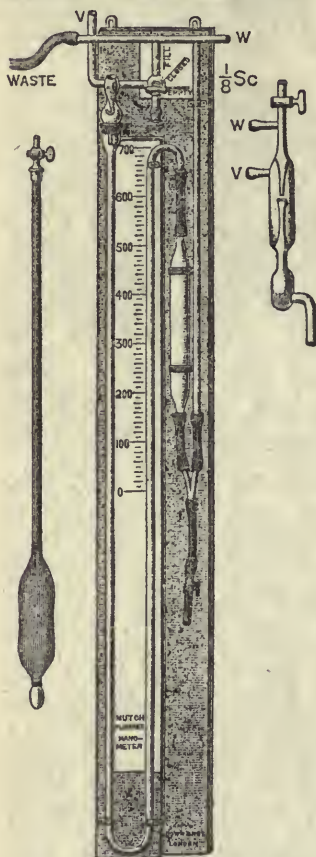


FIG. 2.—The dilator with its specially shaped bag is shown on the left of the manometer. On the right is the vacuum pump. When only one water tap is available water pressure can be secured from a side piece (w) attached to the pump whilst suction is obtained from (v). In fitting up the apparatus w is joined to (w); and v to (v).

namely, the pressure of the water main. If the dilator is connected to a T-piece through the horizontal limb of which a stream of water flows, any obstruction to the outflow of water past the T-piece, will increase the pressure in the dilator bag which, in the event of a complete obstruction, would rise until equal to that in the water main. The pressure can be measured by attaching a manometer, and varied by altering the degree of obstruction in the runaway pipe.

The actual apparatus which I have found most convenient is that shown in Fig. 2. W is connected to the water main, and the waste water is led back to the sink again from the other end of the horizontal tube. The dilator bag is connected just below the stopcock near the top of the apparatus. When the waste pipe is compressed, the pressure rises in the bag and is recorded by the mercury manometer, fitted as shown.

The wide tube to the right of the manometer in Fig. 2 is introduced so that, as the pressure rises in the system, the water does not find its way to the

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mercury in the U-tube of the manometer. This end is secured if the volume of this wide tube is about twice the volume of one limb of the U-tube. The small pinch-cock below the wide tube allows the water to drain out of the apparatus at the conclusion of the operation. When the compression on the waste pipe is released, the pressure in the system falls at once. The bag in the œsophagus remains full of water, and should be emptied before it is withdrawn. To accomplish this, the stopcock just above the nozzle for the bag, which is a three-way cock, is turned so that, instead of joining the bag to the water system, it connects it to the tube *V*, which is attached to a suction pump. In about 30 seconds the bag is empty, and can then be withdrawn.

The same apparatus can be used even when a water main is not available. In such a case, *W* is connected to a bottle of water under pressure, the compression having been secured by pumping air into the space over the water with a bicycle pump; *V* is connected to an empty aspirating bottle, and the waste pipe is closed. It must be remembered, however, that a very considerable pressure is required, equal to about 24 feet of water.

If the radioscopic examination shows considerable pouching of the œsophagus, about a yard of silk thread should be swallowed by the patient on the evening before the manipulation. During the night this finds its way into the duodenum. A little more can be swallowed on the following morning. This cord when threaded through the hole in the metal olive of the dilator acts as a guide along which the tube is introduced into the stomach, in spite of the sinuous nature of the passage. Unless there is much pouching, the silk guide is not needed. It is inadvisable to administer a general anæsthetic, but the anæsthetization of the fauces and pharynx by

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careful painting with cocaine, adds very materially to the comfort of the patient. The procedure causes even less distress, to a patient prepared in this way, than does the passage of the stomach tube in the routine of test meal analysis.

The apparatus is prepared by attaching the dilator, distending it with water and emptying it again several times by turning the three-way cock backwards and forwards. By this means, the air is removed from the tubes. Finally, the bag is reduced to its smallest bulk by exhaustion, its tap is closed, and the three-way cock is turned to the position marked "Fill," *i.e.*, the nozzle attached to the dilator is now joined up to the water system.

The patient is seated in front on an X-ray screening stand, and the X-ray tube centred on the diaphragm. The dilator, lubricated with glycerine, is passed until the olive is 19 or 20 inches from the teeth. The position of the bag is then observed radioscopically, and corrected until it lies halfway through the cardiac orifice. The dilator usually enters into the stomach so easily that one cannot detect any resistance as it passes the cardiac sphincter, and the only method of determining that the bag is in its correct position is by seeing the metal olive head about four inches below the diaphragm on the fluorescent screen. The dilator is held in the right hand, and its controlling tap is opened with the left. The waste pipe is slowly compressed with the left hand until a pressure of 600 or 650 mms. is registered by the manometer. This pressure is maintained for a minute or so and then slowly allowed to fall. As the stretching takes place the patient usually feels an acute discomfort near the lower end of the sternum. The three-way cock is then turned to the position marked "Empty," when the water is quickly sucked out and the dilator can be withdrawn.

The substernal pain subsides immediately, and the

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patient is at once able to swallow properly. For 24 hours or so, there may be a little soreness, but not of sufficient severity to interfere with eating. The dilatation should be repeated two or three times at intervals of three or four days. It is impossible to lay down a definite rule. Sometimes as many as five dilatations are needed, and in other cases two may suffice. The patient should not be discharged until it is known that the œsophagus has been free from food débris for two weeks. In a certain number of severe cases, a second series of dilatations is needed some months later.

The prospect of permanent cure which this method offers is very great. The best records are those of Plummer, who followed up the subsequent histories of about 100 cases of severe, uncomplicated cardiospasm, treated by forcible dilatation. Eighty-one per cent. had been completely cured for periods varying from one to seven years; 12 per cent. had been partially relieved, and the remainder could not be traced or had died of intercurrent diseases. All the patients were in Stage 3 before dilatation was carried out. The results are obtained even more readily in the earlier phases of the disease, before hypertrophy of the œsophagus has occurred. It is difficult to arrive at a correct diagnosis of such cases, however, without radiosopic examination, and many of them are therefore overlooked. One of the most common errors is to mistake the condition for one of hysterical vomiting, and such a diagnosis should never be accepted until it has been proved definitely that the food passes through the cardiac sphincter into the stomach before it is returned again to the mouth.

If the possibility of cardiospasm is considered in all instances of ill-defined dyspepsia and obscure vomiting, many patients will be spared months, or even years, of unnecessary distress.

Recurrent "Colds in the Head."

By FRED STOKER, M.B., F.R.C.S.

Surgeon in Charge of Throat and Ear Department, Queen Mary's Hospital; Aurist to the National Institute for the Blind, etc.

THOUGH a patient commonly looks upon a cold as a trivial ailment, he bitterly resents its disabling effects. He is apt to look upon his doctor with a somewhat dubious eye should it recur, while, if he is so unfortunate as to suffer from its frequent repetition, he may even consign the medical profession to perdition, and cling with a diminishing optimism to Quack & Co.'s Catarrh Cure; this, look at it as you will, is a distressing state of affairs. The insignificance of the disease is entirely the patient's own interpretation of the symptoms. The actual issue of events is often very different, and the sequel may be of such consequence that life itself is threatened. I use the expression "cold in the head" as the patient uses it. He includes under the term any acute discharge from the nose.

By "recurrent" it is to be understood that the affection has distinct periods of activity and of intermission, and that during the latter there are either no symptoms at all, or else they are so trivial that they do not attract the patient's attention.

It is not within the scope of this article to discuss the symptoms and signs of each of the maladies hereafter referred to, nor to enter into, say, the differential diagnosis of the suppurations of the nose. Its purpose is rather to indicate the roads by the following of which a diagnosis may be reached, and to point out in

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certain instances how a cause can lead to an effect.

With one exception the potent cause of an acute cold, recurrent or otherwise, is organismal infection; the contributory factor, often of immense importance, is a lowered local or general resistance.

This observation is commonplace, yet I mention it, for commonplaces are those facts which are usually overlooked.

A local infection may be chronic and only "flare up" when resistance is lowered, or it may be acute, the organisms entering, one might say, whenever they are in the vicinity, the reluctant host being unable to repel them.

In considering the chronic infections, one is struck by the fact that the nose and its neighbourhood is a particularly favourable spot for the harbourage of germs, and even of unsuspected pus. These germs, lying in ambush, only await an opportunity of attacking their patron with redoubled energy; the opportunity comes when his resistance is suddenly lowered.

Infected sinuses, particularly the maxillary antra and the ethmoid cells, are common offenders, and are frequently without indicative symptoms. It is very natural that a symptomless infected sinus should pass unquestioned when inquiring into the primary cause of acute rhinitis, unless, indeed, it is appreciated that such an infection may be present; and that is the very essence of the matter. There is always a greater probability of a thing being found when deliberately looked for than of it being stumbled upon by accident.

There is not the slightest difficulty in diagnosing sinus suppuration when it is accompanied by purulent discharge, cacosmia, contrast on transillumination, and pus in the upper two-thirds of the nose; but elucidation is not so simple when such symptoms are absent. As illustrations:

J. A. B., a soldier who served four years in France, had suffered

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from frequent and severe colds in the head since 1917. During the intervals, the nose was normally dry, no pus was seen on examination either in the nose or naso-pharynx; transillumination and radiography were negative.

On being asked specifically, he thought that, during a cold, there was more discharge from the left nostril than from the right. Puncture and irrigation of the left antrum procured about two drams of thick clotted pus and operation upon it resulted in curing his colds.

Miss L. H. was referred to me by her doctor on account of her "tendency to catch cold." She had a large pad of adenoids from which muco-pus was apparently exuding, but nothing more was discovered on examination. The beautiful transparency of the antra and frontal sinuses was especially noted. I gave a confident opinion that adenectomy would remove the mischief and performed the operation forthwith.

A month later, to my dismay and the patient's disappointment, the condition was as bad as ever. There was still muco-pus in the naso-pharynx. She certainly said that when she "caught cold" the discharge was not quite so profuse as before, but I suspect that remark was made more to keep me in countenance than with any scientific regard for accuracy.

There was no pus visible on anterior examination; there was, as already noted, some muco-pus on the posterior wall of the naso-pharynx, and a tiny half-dried crust was seen under the right middle turbinal posteriorly. Transillumination showed the antra and frontal sinuses as clear as before. However, the naso-pharyngeal discharge on this occasion, the adenoids having been removed, suggested the cause and the crust served as a finger-post.

The right antrum contained muco-pus.

So far as ethmoid disease is concerned, before responsibility can actually be fastened upon it as the primary cause of acute recurrent rhinitis, antral and frontal disease should really be excluded. This is, however, a refinement of diagnosis which is rarely called for in general practice. Half the battle is won in localizing the *fons et origo mali* to sinus disease.

It may be stated, however, that a useful guide to the existence of ethmoid mischief, whether primary or secondary, suppurative or hyperplastic, is the enlargement of the bone, particularly of those portions of it described as the middle turbinal and the bulla ethmoidalis. Again, if the condition is of some duration, polypi in the middle meatus will probably be apparent. The latter formations are common in all sinus sup-

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purations, but I think commonest in ethmoiditis.

In chronic frontal sinusitis the discharge is commonly constant, and therefore if a patient referred to it as a “cold,” he would speak of the latter as being constant, not recurrent.

Sphenoidal suppuration again does not appear to be a common cause of recurrent rhinitis, unless it is associated with disease of the ethmoid. In uncomplicated cases of sphenoiditis the usual complaints are of a discharge in the back of the throat, a “sore-dryness” in the same position, and headache.

In childhood the cause, above all others, of recurrent colds is adenoids, and particularly chronically inflamed adenoids. The latter are more or less bathed in a muco-purulent secretion which trickles down the back of the pharynx and can be readily seen there. The effect of adenoids in this connection is by no means confined to childhood, and must be constantly kept in mind.

The part of chronically infected tonsils in the causation of acute recurrent catarrh is of great interest and importance. A common remark made by patients in describing their attacks that “it always flies to the throat” only errs in the choice of the preposition. “It always flies *from* the throat” would be more in accordance with fact. During the intervals the tonsils appear the very embodiment of innocent retirement; so definite is the latter proclivity indeed that, on superficial examination, they not uncommonly appear quite hidden in the tonsillar fossæ. If, however, a few firm stroking movements are made with the index finger over the anterior pillar in a vertical direction, not only is an abnormal hardness of the tissues appreciated but, if the pillar is retracted forwards and outwards, a foul smelling material is seen to be squeezed out of the tonsillar crypts—a material reeking with micro-organisms. What is more, it is extremely

likely that the investigator will find the same organisms in the nose.

Mr. W. M. Y., aged 40, a city merchant, had suffered from recurrent colds since his school days. He had had adenoids removed and the nasal septum resected; vaccine therapy had not improved matters nor had his many sojourns to health resorts. He was, in short, "fed up." It required considerable persuasion to induce him to part with his tonsils, even after demonstrating their stinking contents, but he eventually submitted to the operation. Two years afterwards he volunteered the gratifying information that, since the removal of his tonsils, he had never been so free from "colds" in his life. The tonsils in this case were about the size of the vertical half of a broad bean.

I have only clinical evidence of the association of pyorrhœa alveolaris with acute colds. The value of bacteriological findings, in view of the enormous number of organisms in the mouth, is difficult to assess. Whether direct infection or the resulting low resistance consequent on the disease is the important factor I cannot say, but no doubt whatever is in my mind about the part played by oral sepsis in causing acute nasal infection.

Inasmuch as one of the essential conditions of a healthy and resistant nasal mucosa is the free passage of air over it, it follows that any type of nasal obstruction will predispose to disease. This sequel, however, is not so common as one might suppose, and I would urge the importance of excluding all possible infective agencies before putting the onus of recurrent "colds" upon nasal obstruction, pure and simple, whether caused by deformity or hypertrophy. A great deal of discredit has fallen upon such operations as sub-mucous resection of the nasal septum because its performance has in no wise reduced the liability to the colds for which its performance was undertaken, and that for the very good reason that the nasal septum was not responsible for the condition.

So far as hypertrophy of the inferior turbinals is concerned, it is rather a result than a cause; and,

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though a vicious circle can readily be developed, it is advisable to look for the cause of the hypertrophy. It may be compensatory to a septal concavity; it may be due to infection in the tonsils or naso-pharynx, or it may accompany an early sinus suppuration. A fact which may well be borne in mind whilst gazing with speculative interest upon a large turbinal is that a mild general toxæmia may not be guiltless. A blue pill, and a few doses of rhubarb and soda, will often work wonders. Perhaps the majority of cases of acute recurrent “cold” are those in which there is no responsible local lesion, but where there is an inherently weak resistance to the causative organisms. The point is arguable, but I think that at present this represents the consensus of opinion.

This state of affairs should never be presumed until all possible local infections have been carefully excluded.

It is in this type of case that vaccine therapy is indicated, associated with measures calculated to better the resistance—fresh air, exercise, a daily bath, attention to the excretory functions, the ingestion of sufficient food rich in vitamines, and the absorption of, say, two quarts of bland fluid daily; salts of iron are useful, particularly as they appear to increase the absorption of vitamines.

The one exception to organismal infection as the cause of acute “colds” is a nasal condition known as spasmodic rhinorrhœa, spasmodic rhinitis, or vasomotor rhinitis. The first title is the least compromising, and, as it not only represents accurately the symptoms of the malady, but is also the least likely to mislead, we shall adhere to it.

The symptoms are well known: A person subject to it, in the midst of apparent health, without the slightest warning finds “his nose bunged up and running like a tap, his head like to burst, his sneezing

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uncontrollable, and in general 'done to the world,' " to use a patient's expressive description.

The release from such a torture is as sudden and complete as its infliction, and within a few minutes or hours, as the case may be, the patient is himself again.

The disease is akin to asthma, and its treatment is as difficult.

General measures are of great importance. Any toxæmia must be removed, any deficiency supplied, and any excess corrected. An illuminating contribution on "Hyper- and Hypo- Thyroidism," by Sir James Barr, appeared in THE PRACTITIONER for June last. In it Sir James points out that in hyperthyroidism the viscosity of the blood is diminished owing to the excessive excretion of calcium, the arterioles are dilated and the venous pressure is raised. One is impressed by the resemblance of these phenomena to the condition obtaining in the nose during an attack of spasmodic rhinorrhœa. Soluble calcium salts would seem to be strongly indicated, and as a matter of fact are often of great benefit, particularly the freshly prepared lactate in doses of from 15 to 30 grains three times a day after meals.

A daily dose of $\frac{1}{2}$ m. of Liq. Atropin. Sulph. for 10 days is often of value, while removal to a more congenial air will often work marvels.

So far as local measures are concerned, their effects are uncertain. Sometimes they mitigate the trouble, at others aggravate it. Light cauterization of the septal tubercle, the application of pure carbolic to that portion of the nostrils anterior to the middle turbinals, and the painting of the vestibule with a 25 per cent. solution of silver nitrate, all have their advocates and, naturally, their critics.

Nonthyrotoxic Goitre.*

By E. G. SLESINGER, O.B.E., M.S., F.R.C.S.

Assistant Surgeon to Guy's Hospital.

THERE are many methods of classifying non-toxic enlargements of the thyroid gland, and while the knowledge that we possess of the ætiology of goitre is as small as it is at present, it does not matter very much which one adopts. Therefore, while it is unsatisfactory, pathologically, in many respects, I propose adopting the following grouping, so that we may know just what class of case we are referring to as we go along. While innocent goitre is very common, and is, I think, becoming more so, malignant goitre is relatively rare.

Innocent Goitre.

- | | | |
|--|---|---------------------|
| 1. Parenchymatous goitre | { | Physiological. |
| | | Toxic. |
| | { | Congenital. |
| | | Acquired. |
| 2. Colloid goitre | { | Adenoma |
| | | Diffuse |
| | | Diffuse adenomatous |
| | { | Cystic. |
| | | Fibrous. |
| | | Calcareous. |
| | | Osseous. |
| 3. Foetal adenoma. | | |
| 4. (<i>Hyperplastic Thyrotoxic goitre (Graves's disease).</i>) | | |

Malignant Goitre.

- | | | |
|-------------------------------|---|-------------------------------|
| 1. Epithelial tumours | { | 1. Carcinoma. |
| | | 2. Malignant adenoma. |
| | | 3. Metastatic colloid goitre. |
| | | 4. Parastruma. |
| | | 5. Postbranchial goitre. |
| | | 6. Papilloma. |
| | | 7. Cancroid. |
| 2. Connective tissue tumours. | { | 1. Sarcomata. |
| | | 2. Endotheliomata. |
| | | 3. Peritheliomata. |

* Based on a clinical lecture delivered at Guy's Hospital. Specially rewritten and revised for THE PRACTITIONER by the author.

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Physiological enlargement occurs at the periods of sexual stress in life, particularly in women, at puberty, at the menstrual period, during pregnancy and lactation, at the menopause, and during sexual intercourse. It is often no more than a hyperæmia of the gland, but it may produce actual hypertrophy, and is sometimes the starting-point of definite parenchymatous goitre into which it merges.

A class of case which may be considered to come almost within this group, though it is not perhaps strictly speaking physiological, is the enlargement which sometimes occurs as the result of sepsis. In children I have seen cases in which the patient was brought up on account of the enlarged thyroid, and in whom the goitre disappeared when infected tonsils were removed. This would appear to represent a definite reaction to infection, and we see it sometimes with all forms of sepsis, though in my experience the tonsil is the commonest site in children. In adults you meet with a similar enlargement in some cases of chronic intestinal stasis, in which again the hypertrophy is a reaction to infection. In all these varieties if the exciting cause is removed early, the enlargement disappears, but if it is allowed to act for a length of time a goitre persists. Many cases of endemic goitre would appear to be closely related to this group.

Congenital goitre, apart from cretinism, is rare and occurs mainly where the disease is endemic or more rarely in the offspring of goitrous parents. It is usually of the parenchymatous type, though other varieties have been described, and it is sometimes large enough to produce death at birth. If the infant survives, the goitre tends to decrease in size, probably because there is less call for thyroid after birth than during the latter part of intra-uterine life.

Acquired parenchymatous goitre occurs in both

endemic and sporadic form, and although McCarrison and others have advanced good grounds for the belief that the endemic group is toxic or infective in origin, the same explanation does not appear to hold for the sporadic cases as we see them. In these patients it is always very striking that they are mostly of the extremely feminine type, and not only are the secondary sexual characters well developed, but they generally set greater store by their personal appearance than other patients of the same class, and they are temperamentally in tune with their appearance. There seems little doubt that the thyroid is normally capable of meeting varying demands on it within considerable margins. When an individual is born with a less, or insufficiently active, amount of thyroid tissue, he is no longer capable of meeting increased demands. As an extreme example, we have the cretin with a large goitre in whom the hypertrophied gland is not even able to meet the normal demands of life. In a lesser case, such as the individuals we are considering, the gland is quite able to meet normal demands, but the patients on account of their characteristics would seem to make larger calls on their thyroid, particularly at certain periods of special stress, and the hypertrophy which occurs in consequence persists as a permanent goitre. This type of case does well with medical treatment with thyroid extract if seen early, but when the definite hypertrophy is established a goitre usually persists. There seems to be considerable doubt whether these parenchymatous goitres do actually produce an increased amount of secretion compared to the normal gland. They probably do to a certain extent, but not in any degree commensurate with their size, in that removal of large portions of the gland very seldom gives evidence of thyroid deficiency. It is a common

practice to include our next group, the colloid goitre, with the parenchymatous. I do not think this is a good plan, because there is no evidence that the one ever passes into the other, and histologically they are distinct types.

The colloid goitre is the commonest that we see, and differs from the parenchymatous only in that the vesicles are enormously distended with colloid, as well as increased in number. This process may be diffuse throughout the gland, or it may occur in circumscribed portions only, producing the adenoma of adult type. Somewhat less frequently the process occurs throughout the gland, but in irregular fashion, producing a gland with masses of colloid tissue separated by normal portions, the diffuse adenomatous type. In spite of the great size of many cases of colloid goitre, there is no evidence of any definite neoplastic character, the picture being one of functional hyperplasia, retention of colloid, regenerative growth and regressive inflammatory changes. Colloid goitre, particularly the adenomatous type, is the commonest form of goitre, as we see it, and is what is usually meant when we speak of adenoma of the thyroid. A characteristic of colloid goitre is the tendency to cyst formation. The distended alveoli burst into one another and large colloid containing spaces are formed. Hæmorrhage into these spaces is common, and increases their size, sometimes very suddenly. In old-standing cases the walls of such cysts are apt to become fibrous, calcified, or even bony. There is another very serious change to which these cystic adenomata are liable. It usually occurs in cases of long standing, and seldom before the age of 35 or 40; it consists in the onset of definite symptoms of hyperthyroidism. Such a condition has been given the clumsy name of Basedowified Goitre, but is

better referred to as thyrotoxic adenoma. Pathologically, you will find in some portion of the cyst wall an area of definite cellular hyperplasia, just as in true exophthalmic goitre.

Foetal adenoma appears in the form of small or large opaque nodules in one or both lobes. They grow slowly, and sometimes get as large as a fist. Clinically, they resemble the ordinary adenoma, but you can sometimes distinguish them in that they feel more definitely encapsuled than the colloid adult type. They are either single or multiple and in one or both lobes and hæmorrhage into them occurs frequently. Histologically, they show numerous small alveoli with cubical epithelium, and without colloid, or sometimes small round cells with a deeply staining nucleus and no lumen, that is to say similar to the developing gland. They are derived, according to Wölfler, from superfluous embryonic thyroid epithelium which he has shown to lie scattered throughout the organ.

These are the types, then, of nonthyrotoxic innocent goitres, and we must now consider in what way they interfere with the individual and, consequently, what are the indications for surgery in their treatment. By far the most important symptoms are those due to pressure of the enlarged gland on neighbouring structures, and of these that most frequently affected is the trachea. The manner in which it is interfered with depends on the nature of the goitre.

When the enlargement is symmetrical, the trachea becomes gradually flattened by the lateral pressure of the enlarged lobes, without being displaced from its mid-line position. The flattening may be extreme, and the lumen can be reduced to a mere chink, a condition known as "scabbard trachea." If the goitre is asymmetrical, the larynx and trachea are

displaced laterally, often to an extreme degree, and the obstruction produced by kinking can be considerable. A third way in which the trachea may be compressed is in intrathoracic goitre. Here the goitre has grown from the lowest part of the lobe, or, possibly, from an accessory thoracic thyroid, and may be either wholly or partly intrathoracic in situation. Such a goitre is liable to become impacted in the thoracic inlet, and in so doing may compress the trachea from before backwards. Such a patient may be most dramatically asphyxiated during an attack of coughing. Even without actual impaction, intrathoracic goitre can interfere seriously with the trachea and every case in which respiration is obstructed should be X-rayed as a guard against the presence of an unsuspected intrathoracic tumour. In some cases the goitre, while usually intrathoracic, comes up into the neck with certain movements, the so-called "goitre plongeant," a type which is specially liable to impaction. Curiously enough, totally intrathoracic goitre is commoner in men than women, and at ages over 30. Ptosis and fixation of the larynx are of help in diagnosis, and associated dysphagia is common. Sometimes there is definite venous obstruction with caput medusæ, but in all doubtful cases an X-ray photograph is the safest means of diagnosis.

The chief symptom of tracheal obstruction is dyspnœa, which is increased by exertion or conditions causing congestion of the goitre such as coughing, pregnancy, etc. Such a patient is always in danger, in that enlargement of the goitre by bleeding into it or swelling of the trachea from tracheitis may at any time threaten suffocation. These patients tend to have a troublesome cough which is deep and sonorous in character, and they show changes in the voice, due partly to altera-

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tions in the relative insertions of the vocal cords and partly to muscular weakness. They have a curious jerky speech, which is well described as "vocal awkwardness."

Another pressure-result of importance is interference with the recurrent laryngeal nerve, which, although it is far commoner in malignant goitre, is present in a proportion of innocent cases. It is a curious fact that it is far commoner on the left than the right side, even in right-sided goitres, and, further, it occurs three times more often in men than in women, although goitre, as you know, is commoner in women. In 289 cases of recurrent nerve injury reported by Crotti, 162 were left-sided, 93 right-sided, and 17 were bilateral.

These patients are at first aphonic, but later the sound cord increases its swing beyond the mid-line, and the voice recovers. The singing voice, however, does not return. These patients have a troublesome cough, occurring in spells, without expectoration, the cough being loud and dry and quite distinctive from that of tracheal obstruction. In rare cases the goitre may interfere with the sympathetic, giving symptoms on one side of the face. Excitation gives unilateral exophthalmos, dilated and sluggish pupil and enlarged palpebral fissure, while paralysis, which is rarer, gives ptosis, small palpebral fissure, exophthalmos and redness of the ear. These are the main pressure-symptoms of goitre, but, in addition, old-standing cases are liable to the development of one variety of goitre heart. I do not refer to the thyrotoxic heart due to overaction in cases of exophthalmic goitre, but to a type of heart affection afflicting old-standing cases of large non-toxic goitres. The symptoms are, first, breathlessness, and later vertigo, congestion of the face, epistaxis, palpitation, and ultimately œdema and anasarca. Explanation of this form of goitre

heart does not come within the province of surgery, but it would seem to be at any rate partly due to the goitre-stenosis interfering with the pulmonary compensation during the expansion of the thorax in respiration.

Another consideration which cannot be overlooked in goitre cases is the question of deformity. This may not seem to be of much importance, but it very often is extremely so to the patient. On the whole it is not very often that operation is undertaken for this disability alone, and each case must be decided on its merits, but we must not lose sight of the fact that the restoration or preservation of beauty involves, in women, a host of physiological considerations of no small importance.

When examining a case of goitre, evidence of hypo- or hyperthyroidism must always be looked for, quite apart from such extreme conditions as myxœdema or Graves's disease. In many cases none will be found, but when it is, it will sometimes help in deciding on the treatment. Patients with old cystic adenomata may, as we have seen, develop symptoms of active hyperthyroidism from hyperplasia occurring in their walls; but other cases show a milder form of overaction, possibly due to stimulation by pressure of the surrounding gland substance. There is a type of tremor which is frequently present in association with adenomata, which must not be mistaken for the tremor of Graves's disease, and can be distinguished by its being far coarser and slower.

From a consideration of the foregoing symptoms it will be apparent that the most definite indication for surgical intervention is interference with respiration, and, indeed, the presence of any of the above described pressure-symptoms will indicate operation. This is advisable in nearly all cases of adenomata, partly because of their tendency to increase in size,

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and partly on account of the changes they undergo in old-standing cases. We have to remember that not only are these patients liable to develop a goitre-heart if left alone, or to acquire symptoms of hyperthyroidism, but, although it is an uncommon complication, it is none the less true that 90 per cent. of malignant cases develop in old-standing goitres.

Again, there are certain dangers of sudden death to which a patient with goitre is exposed, as by sudden changes of position during sleep, by sudden increase in the goitre during pregnancy, or at any time by hæmorrhage. Then, again, acute oedema of the glottis may occur, particularly during pregnancy, or there may be sudden choking, with no previous dyspnoea, due to spasm of the glottis from recurrent laryngeal nerve injury. Finally, there is what the French describe as "*le mort sans phrases*" due to goitre-heart, in which, at a post mortem, you find an extreme condition of brown atrophy and fatty degeneration.

Malignant goitre is far from common, but is a most interesting condition in that the pathology of some of the varieties met with is as yet so far from clear. Ninety per cent. of the cases develop in a pre-existing goitre, and more than 60 per cent. are over 40 years of age. The epithelial tumours are particularly interesting, some of them being very much on the borderland between innocent and malignant growths.

1. *Carcinoma*, when it occurs in the thyroid, forms a hard nodular tumour, very like carcinoma *mammæ* both to feel and on naked-eye section. It behaves much like carcinoma elsewhere, metastasizing by way of the lymphatics, and its sole peculiarity is a decided predisposition to form secondary deposits in bone.

2. The so-called *malignant adenoma* is a curious tumour which occurs as a single nodule of growth. It is soft and cuts like marrow, and on section shows

large polyhedric fields of cells, with numerous sinusoid blood-spaces. The vesicles are irregular, and lined usually with one layer of cells, in close relation to the blood-spaces. The growth tends rapidly to invade the veins, and the whole picture is very similar to a section of the developing organ.

3. *Metastatic colloid goitre* is an extremely rare condition, which is of very doubtful malignancy. Histologically, the gland is indistinguishable from ordinary colloid goitre, and the sole unusual feature is its metastasizing power. It spreads by the vascular route, and is prone to form deposits in the bones. Even when these occur, however, cases have lived as long as 17 years. While there is insufficient evidence by which this form of goitre can be satisfactorily grouped, it would appear probable that it is incorrect to include it among the malignant growths of the thyroid. The secondary deposits in this condition have been shown, in some cases, to secrete what is apparently normal thyroid secretion.

4. *Parastruma* is an interesting and rare tumour in which a hard nodular mass forms in the thyroid, grows rapidly, and speedily becomes adherent to surrounding structures. It forms secondary deposits, and runs a rapid course. Albert Kocher has shown that the cells of this type of tumour contain a considerable amount of glycogen, and considers that they derive from remnants of the parathyroids.

5. *Post-branchial goitre* has been described as a distinct variety of tumour, but it seems doubtful whether it does in reality constitute a definite type. It is said to form large irregular nodules sharply outlined from the rest of the gland and of rapid growth. Its cells are large and have the appearance of liver cells, the tumour being said to be derived from the post-branchial bodies.

6. The *malignant papilloma* is usually small in size,

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and either solid or cystic. It is arborizing in structure and sometimes contains colloid. It behaves like ordinary carcinoma, metastasizing in the lymphatic glands, and is of considerable malignancy.

7. A curious type of tumour which occurs occasionally and is termed *cancroid*, is of doubtful thyroid origin. It is never very large, is extremely hard, and has an irregular surface. In section it is white and granular, and typically like the epitheliomata. It always occurs at the same spot, and early perforates the trachea in the neighbourhood of the first tracheal ring. It would appear probable that this growth is derived from the epithelium of the pharynx or possibly from the thyro-glossal tract.

The connective tissue tumours occur as a rule earlier in life, and are less common. A considerable amount of confusion has arisen from the fact that certain epithelial tumours are altered by pressure so that they are very difficult to distinguish except by repeated sections, and it is probable that sarcoma is even less usual than it appears to be. Endotheliomata and peritheliomata have been described, but are rare tumours.

The usual history in a case of malignant goitre is that the patient has had an old-standing goitre, and that recently it has been noticed that one lobe is becoming hard and growing rapidly. Symptoms of invasion of neighbouring structures are, unfortunately, early, and its fixation can be made out on examination. Laryngeal nerve involvement is common, far commoner than in simple goitre, and the sympathetic is involved fairly frequently as well. The vessels in the carotid sheath, instead of being displaced as in simple goitre, are surrounded and invaded, giving congestion of the face, particularly on exertion. Thrombosis of the thyroid or jugular veins is also a valuable diagnostic sign. The most

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important local sign, however, is involvement of the trachea. Not only is dyspnœa induced early, but the growth speedily ulcerates into the trachea, giving rise to bloody expectoration, and ultimately septic pneumonia.

The treatment of malignant tumours of the thyroid is most unsatisfactory, the disease having usually invaded surrounding structures before it is diagnosed. Tracheotomy, if it is called for, is often a most difficult and dangerous proceeding, owing to the vascularity of the growth and the invasion of parts. Even if it is possible to perform it, it is seldom of much avail, for death from broncho-pneumonia speedily follows. The prophylaxis of malignant disease of the thyroid offers the most hope, and consists in operating on all goitres which resist medical treatment. I do not suggest that a patient with goitre should be operated on simply for fear of the possible development of malignant growth. Malignant goitre is very rare and simple goitre very common, so that such a policy would be manifestly absurd. What I do believe, however, is that goitres other than the small parenchymatous or colloid varieties, which have existed for some time, and which have any of the symptoms which we have taken as surgical indications, should be operated on, and further that in advising operation to these patients we should bear in mind the additional point that we are removing a potential, if remote, danger of malignant trouble.

Three Cases of Fracture of the Scaphoid Bone (Wrist).

By F. D. SANER, F.R.C.S.

*Surgeon Evelina Hospital for Children ; Surgeon to
Out-patients, Great Northern Hospital.*

THE following cases have been selected from a small series, since they illustrate very fairly the signs, symptoms, and complications of a fracture of the scaphoid bone, and some of the main points in the treatment of this injury:—

CASE 1.—Pte. McK., æt. 47. Whilst unloading a lorry, the patient and another man were lifting down a heavy case of mineral water, and when this was on about a level with their shoulders the other man let go throwing the whole weight on to the patient's left hand. He at once felt a sharp pain in the wrist, which caused him to drop the case.

When seen at the hospital next morning, there was considerable swelling of the left wrist-joint, and all movements, especially extension, were painful. On palpation, the joint was tender, the area of greatest tenderness being immediately distal to the lower end of the radius on the posterior aspect of the joint.

The X-ray report on the above case states:—There is a fracture of the left scaphoid. The line of fracture is from above downwards and inwards between its radial articular surface and that which articulates with the os magnum, at the junction of the upper and middle thirds of the bone. There is no displacement.

The forearm and hand were splinted on a "cock-up" splint. Massage was begun on the fourth day, and some active movements of the fingers encouraged, but movements at the wrist-joint were not attempted till nearly the end of the third week.

At the end of the fifth week an X-ray picture showed quite considerable callus at the site of fracture. At this stage, the patient was unable to extend the wrist at all, but other movements were increasing and painless.

Some eight weeks after the injury, a slight degree of active extension at the wrist could be obtained, while flexion had increased to about 60°. The movements were painless.

(I am much indebted to Capt. F. J. Harlow for his notes on this

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case.)

CASE 2.—Pte. M., æt. 22. While running across a field at night, in an endeavour to catch a train, he stumbled over a mound guarding a deep ditch, and dived some 6 feet. The ditch was dry and he came with full force on to his two outstretched hands. In his anxiety to catch the train, he got up and ran on, but noted that his wrists were exceedingly painful. On reaching his destination, he fainted when getting out of the train, and was taken to hospital.

I was asked to see this patient about six weeks after the accident. The first X-ray picture had shown a comminuted fracture of the left scaphoid and a fracture of the right scaphoid and os magnum. After six weeks there was practically no power of active movement in either wrist, and any attempt at movement was painful. The fingers could be almost fully flexed and extended, but any effort to grip caused pain in the wrists. A second X-ray picture was taken of both wrists, and this showed the fractures, with apparently no callus formation whatever, while there was decided atrophy of the fragments of both scaphoids, and to a lesser extent of all the carpal bones.

It was decided to excise the left scaphoid first, and at a later date, the right. This was done with an interval of a month between the operations.

The last time I saw this patient was nearly two months after the second operation. Active flexion to about 45° was possible in both wrists, but extension was very limited to a few degrees only. The main point was, however, that the movements were not painful, and, owing to this, the gripping power of both hands had increased very considerably.

CASE 3.—Mr. C., æt. 28. When descending from a moving tram, he slipped and fell forwards on to his right hand, not quite saving his face from injury. He was more concerned at the time about a grazed nose, but noticed his right wrist was painful. The next day the wrist was swollen and very painful, so he sought medical advice. Strapping was applied, and about a week later this was removed, and liniment ordered for the purpose of rubbing.

It was over five months after the accident when I saw this patient first. He complained that he had practically no strength or power of movement in his right wrist, and that it ached severely after even slight use of the hand.

The whole wrist appeared somewhat thickened, was tender, and had lost its flexibility to a most marked degree. The grip was weak and painful.

An X-ray showed an old comminuted fracture of the right scaphoid. The fragments were extremely atrophied, and there was apparently no attempt at bony union. In addition, there were obvious arthritic changes in all the joints of the scaphoid.

An excision of the scaphoid was advised with the hope that some increase of movement (flexion) might be gained, but chiefly that the pain, partly due to non-union, might be diminished. With definite arthritic changes present more than this could not be

FRACTURE OF SCAPHOID BONE

expected.

Three months after the operation, there was some improvement, sufficient, on the whole, to have justified operative interference. There was a slight increase in the range of movement and less pain; but the wrist was still weak and ached after much use. Some six months after the operation, the patient wrote stating that there was further slight improvement; he had attempted to play golf the day before writing, with, however, apparently limited success only.

These three cases show certain points which are common to all fractures of the scaphoid. The accident in each case was one of severity, causing a momentary hyper-extension of the wrist. The immediate signs and symptoms as seen in Case 1 are typical, while the history of a fall on the hand and the somewhat thickened, weak and painful wrist with very restricted movements as seen in Cases 2 and 3 is almost diagnostic of an old-standing injury to a carpal bone, most commonly the scaphoid.

In all cases, two or more articular surfaces are involved and thus callus may eventually obstruct movements, and for the same reason arthritic changes are very liable to supervene. Owing to the small size of the fragments they atrophy rapidly; on this account and often also because of lack of treatment in the early stages, it may be said that non-union of a fractured scaphoid is the rule rather than the exception.

The treatment varies according to the time at which the case comes under observation. When seen early, the forearm and hand are splinted with the wrist slightly extended. Massage is begun during the first week, as well as some active movements of the fingers, but the wrist should be kept immobilized for at least three weeks, after which the ordinary treatment for fractures can be carried out.

Immobilization gives the best chance for repair to take place in the scaphoid, though there is no guarantee, even with the most careful treatment, that

union will occur, and the prognosis is always doubtful.

If, as in Case 2, at the end of six weeks the fracture is ununited, with consequently painful and limited movements, excision of the whole scaphoid is the best treatment. At this stage the fragments are so atrophied that the likelihood of repair has passed, while arthritic changes, if not already present, are bound to supervene.

In Case 3, in addition to non-union in the scaphoid, arthritic changes in the inter-carpal joints were marked. In such a case the wrist-joint has already been permanently destroyed, and the result of any treatment is problematical. It is, however, I believe, even at this stage worth while excising the scaphoid, since my impression is that much of the pain and aching after movement is due to the ununited fracture apart from any changes in the joints.

The end-result after an excision of the scaphoid will vary directly with the length of time that elapses between the injury and the operation, in other words, to what extent arthritic changes have developed. The operation cannot restore a wrist to normal, and its main object is to alleviate pain and thus give a greater freedom of use, especially in the power to grip, and consequently increased strength. With this as the primary consideration, excision can be advocated, but it is unlikely, as a rule, to have any decided effect on the movements at the wrist itself; in some cases the range of movement is definitely increased, while in others there is no alteration, but this again is dependent on the degree of destruction of the carpal joints by osteoarthritic changes at the time of the operation.

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A Review of 150 Cases of Surgical Operations under Local Anæsthesia.

BY DR. K. S. RAY, M.A., B.Sc., M.B., CH.B.

Honorary Surgeon, Sambhunath Pandit Hospital, Calcutta,

AND

DR. L. M. SEN, M.B.

Anæsthetist, S.N.P.H.

ALTHOUGH great advances have been made in the administration of general anæsthetics, particularly in the administration of ether by the open method, the risk from general anæsthesia still remains high. In well-appointed institutions, where the anæsthetics are given by professional anæsthetists, we may find large numbers of cases without a death, but this is not the case in general practice, where the means for resuscitation are not available at a moment's notice, as in hospitals. There is a considerable amount of fear in the mind of the lay people in India, who fight shy of being placed under a general anæsthesia; consequently, the date of the operation is very often postponed from day to day, the lesion becomes far advanced, and the case becomes inoperable, or the operation is performed too late and the case terminates fatally. In view of these factors, it has been the practice now at Sambhunath Pandit Hospital to resort to local anæsthesia whenever this can be advantageously applied, and thus help to eliminate, or at least diminish, one of the greatest sources of anxiety in surgical cases.

It must, however, be admitted that local methods of anæsthesia possess certain disadvantages to the

operator in view of the fact that rather more time is required. This makes it a little unpopular with many surgeons, especially those who have to perform a large number of operations daily. Still, the advantages to the patient are often so great as to make local anæsthesia the method of choice in many cases in which, owing to impaired function of kidneys and other conditions, general anæsthesia is contra-indicated. Now, a large proportion of cases at Sambhunath come specially to be operated on by this method.

The total number of cases reviewed in the present paper is 150. A record is kept of all operations under local anæsthesia of the following points: (1) Serial number; (2) nature of operation; (3) anæsthetic used; (4) amount of anæsthetic used; (5) interval between administration of anæsthesia and the beginning of the operation; (6) duration of operation; (7) preliminary injections; (8) complications.

Nature of Operation included operations for: Radical cure of hydrocele; hæmatocele; scrotal tumour, with involvement of the skin of the penis; elephantiasis; hernia; amputation of the arm; enucleation of eyeball; cystic tumours of the neck; goitre (cystic goitre); piles; empyema.

Anæsthetics used were apothesine, novocaine, with adrenalin.

We used apothesine in sixty cases. It belongs to the ester group, and is made with propyl alcohol and cinnamic acid; chemically, it is gamma-diethyl-amino-propyl-cinnamate. It is sold in the form of tablets, with or without adrenalin. It is almost as good as novocaine.

Novocaine was introduced subsequently, and used in ninety cases.

Amount of Anæsthetic used.—Apothesine: The largest amount used was $1\frac{1}{2}$ ozs. of 1 per cent., i.e., about 6 grs. Average quantity used in ordinary cases

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of double hydrocele was about 8 c.c. of 1 per cent. solution.

Novocaine: For an average double hydrocele, the quantity required is about 8 c.c. of .5 per cent. solution. For a case of hernia, in the average 25 c.c. of .5 per cent. solution of novocaine is required.

Interval between Anæsthesia and Beginning of Operation.—In some cases no interval was given; the operation was begun immediately. The longest interval in our record is three hours, with no impairment of the anæsthesia. With apothesine, best results were obtained with an interval of 5 minutes. With novocaine, the results are better with a longer interval. We have found it better to wait for 15 to 20 minutes with novocaine, or even half an hour.

Time of Operation.—Depends on individual operators. On the whole, a little longer time is required with local anæsthesia, because no rough handling or pulling of the tissues can be done.

Preliminary Injection.—All the cases were given, half to one hour before, an injection of scopolamine $\frac{1}{150}$ and morphine $\frac{1}{6}$ to $\frac{1}{3}$ gr., according to the weight of the patient.

Complications were very few; only one case got septic, and there were also two stitch abscesses.

In one case with apothesine, the patient was sick immediately after operation. Whether it is due to the anæsthetic or not is difficult to say.

CONCLUSION.

There is undoubted advantage in many respects with cases operated on by local anæsthesia. It is cheaper. The cost of chloroform is greater, and that obtainable in the market since the war is of indifferent quality; very often considerable time and amount is wasted before anæsthesia is induced. In private practice, patients are saved from the

expense of engaging a separate anæsthetist; the surgeon himself can give the anæsthetic. There is no anxiety or risk of heart-failure, or other evil effects of general anæsthesia. The patient need not be purged the day before the operation or starved in the morning, as for general anæsthesia. An enema in the morning before operation is all that is required. The patient is thus saved from the weakness resulting from purging. The patient can have a light diet before, and his normal diet immediately after, the operation. During the operation the patient, if not already sleeping, can be engaged in conversation or be allowed to drink water, milk or tea, or even a little brandy. The nursing staff is saved the careful watching after the operation, as in general anæsthesia, till the patient comes out of chloroform. In cases of hernia, local anæsthesia should be the method of choice. The greatest advantage here is the absence of vomiting; these efforts, if prolonged or severe, may compromise the results of the operation by loosening the sutures and favour a recurrence of the trouble. There is another advantage with local anæsthesia in hernia cases; the patient may be asked to cough, and this brings out the sac prominently and thus help greatly in isolating the sac. There is often less bleeding in operation with local anæsthesia, because of the adrenaline used along with it. The operation is painless, there is no shock, and often the patient is not aware that the operation is finished until he is told so. Nervous subjects cases are, however, not very suitable for the local method.

In conclusion, we beg to thank Major Gourlay, Dr. Sinha, Dr. Ghosh, Captains Mitra and Bannerjee, and Dr. Bakshi, for co-operation and in making local anæsthesia the method of choice in all ordinary cases at the Sambhunath Pandit Hospital.

Note on Familial Jaundice.

By J. B. C. BROCKWELL, M.R.C.S., L.R.C.P.

Walton-on-Naze:

FOLLOWING the previous notes on the subject of familial jaundice by Sir H. D. Rolleston (THE PRACTITIONER, January, 1920) and Dr. A. P. Agnew (*ibid.*, September, 1920), the following case may be of interest:—

In September, 1920, Mrs. V., aged 37, asked me to attend her at her confinement, the expected date of which was December 2.

On questioning her the following history was elicited: She had had seven previous full term pregnancies and two miscarriages at the fourth month. All the children, except the first, developed "jaundice" on the second or third day, which lasted for about five months, except in the case of the fourth child, which died, aged one week, from "jaundice and convulsions." None of the others had "convulsions."

The mother had always had good health; neither she nor her parents, brother, or sisters have had jaundice. Syphilis can be excluded.

Mrs. V. was ordered sodium salicylate, grs. 10, with hexamine, grs. 5, t.d., which she continued to take up to the date of confinement. There was no vomiting throughout the pregnancy.

On December 3 she was duly delivered of a healthy male child weighing $7\frac{3}{4}$ lbs.

Up to now (seven months) there has been no suspicion of jaundice in the child.

Practical Notes.

Axillary Semeiology in the Diagnosis of Pleuro-pulmonary affections.

Professor Mouriquand draws attention to the signs furnished by examination of the axilla :—

1. In *pneumonia*, especially in infants, in which the only physical signs to be found are very often fine râles and the want of expansion in the sub-clavicular region, and more seldom dulness in the axilla.

2. In *tuberculosis*, the first appearance in the axillary region is far from uncommon in children and young people. The evolution may take a rapid course with serious caseation. On the other hand, it may remain localized for a long time at the level of the axilla. It is at this level that are best appreciated the lesions fairly common in, and near to, the fissures of the lung.

3. In *pleurisy*, dulness in the axilla is a physical sign of great importance for the diagnosis of purulent effusions, and the examination of this region should be made methodically and frequently. The axillary region is, indeed, a favourite place of refuge for pleural suppurations, especially those of long standing. Inter-lobar pleurisy, either in the child or in the adult, often presents its predominant or exclusive symptom in the axilla.

In patients looked upon as tuberculous, because their physical signs suggest cavitation but exploratory punctures at the base are void of effect, the examination of the axilla will fairly often reveal the presence of pus, whilst examination of all the other points of the chest is negative.

Mouriquand, in conclusion, sums up by stating : “ It is necessary to auscultate the axilla very carefully every time there is reason to suspect the existence of pneumonia in a child or even in an adult. The symptoms are often, at least at first, solely axillary. Not to auscultate the axilla is to leave diagnosis on one side. Sometimes, too, only by auscultation of the axilla will be revealed the existence of a tuberculous focus, which has escaped recognition after auscultation of the apex in front and behind.

Percussion of the axilla will very often render possible the differentiation of an affection of the lung at the base from a pleural affection. A moderate effusion into the pleural cavity presents a dulness, which usually moves round in the axilla and the axillary level of which tends to pass to the posterior level. A medium sized patch of hepatization very seldom moves round in the axilla or only as a rule moves there by depressing its level of dulness from behind forwards, contrary to pleurisy.”—(*Journ. de Méd. et de Chir. prat.*, September 10, 1921.)

Large Doses of Tincture of Iodine in Tuberculous Glands.

Boudreau, of Bordeaux, recommended large doses of tincture

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of iodine in the treatment of chronic pulmonary tuberculosis. Dufour has adopted them in the treatment of tuberculous glands in the neck, and of tracheal and bronchial adenopathies. His method of administration is :—

1. To prescribe 10 per cent. tincture of iodine, without the addition of iodide of potash. It must be fresh, for which purpose only a small quantity is made at a time, 15 grammes every 15 days.

2. The dose is given in half-a-cupful of cold milk, with which it is left in contact for a short time so as to allow the casein and iodine to react. It is taken at the beginning of a meal, but if given in wine it is taken during the meal.

3. The susceptibility of the patients must be tested, and small doses are given to begin with. For the first five days, 15 drops are given twice a day; the dose is then increased by 5 drops until 100 to 150 drops *pro die* are being taken. This amount is kept up for eight days, and then the dose is decreased by 5 drops every five days. In children, according to age, the first dose is from 5 to 10 drops *pro die*, increasing to 30, 40, and 50.

4. As soon as the dose reaches 40 to 50 drops, it is divided into three.

5. If any symptom of intolerance is shown, smaller doses are used, or the treatment is suspended for a time, and this must be done in the event of the pyrexial attacks in tuberculosis.—(*Journ. de Méd. et de Chir. prat.*, September 10, 1921.)

Treatment of Ascariidiosis by Chenopodium Oil.

Léo points out that before the war this therapeutic agent had been adopted for use in Switzerland and Alsace-Lorraine. Riff, of Strasbourg, has had an extensive experience of its use. In one most exceptional case no less than 96 ascarides were passed by the patient. The oil is put up in capsules containing 15 drops in each. The dose for an adult is two capsules, taken at an hour's interval. A strong purgative is given an hour later. One capsule is enough for children up to 15 years old.

Oil of chenopodium has a tendency to constipate, which renders necessary the subsequent administration of a purgative. Another inconvenience is that if taken in too big a dose, 50 or 60 drops for example, it gives rise to deafness of a temporary nature. This is not caused by a dose of 30 drops, but before giving it to a patient it is necessary to find out if he has any chronic otitis; if such is the case, the oil should not be given.

In the case of normal ears, one dose either of 15 or 30 drops is enough to cleanse the bowel of all ascarides in 24 hours. The programme should be made out as follows :—

8 a.m.—One capsule of oil (15 drops).

9 a.m.—A second capsule.

10 a.m.—40 g. of castor oil.

The capsules must not be taken unless the patient can take the purgative at the appointed time. Any purgative may be given, provided it produces a free evacuation, and so does not allow the drug to be retained.—(*Le Bulletin Médical*, September 10, 1921.)

Reviews of Books.

An Atlas of Normal Labour. With an Appendix showing Sylvester's and Schultze's Methods of Artificial Respiration. By G. DRUMMOND ROBINSON, M.D., B.S., F.R.C.P. London: William Heinemann. 25s. net.

THIS atlas consists of line drawings, and photographs, taken of women during labour, a vertex presentation and a breech presentation being represented, in order to show the mechanism of labour. They are reproduced from a series of moving pictures which the author uses for teaching.

The line drawings are sufficiently explicit, but several of the photographs are not so successful.

The educational possibilities of the cinematograph are only in their infancy, and films composed of really good photographs would be of great value both to the teacher and his pupils.

In this atlas additional letterpress would have been of advantage.

Diseases of the Nervous System. By H. CAMPBELL THOMSON, M.D., F.R.C.P. Third edition, revised. Pp. 566. London: Cassell & Co., Ltd. 15s. net.

WE welcome the third edition of Dr. Campbell Thomson's well-known book, in which has been incorporated the essentials of new work without material increase in the size and volume. In particular, some accounts of the researches of Henry Head, Gordon Holmes, Sir W. Lister, Riddoch, and others during the war, especially in connection with the effects of injuries to the spinal cord, the theory of aphasia, and the functions of the cerebral cortex regarding sensation and vision, have been included. A new section deals with encephalitis lethargica. In regard to the psychoneuroses, the author has wisely confined himself to an outline of the more salient points. The book is clearly and succinctly written, and, while maintaining its convenient size, the author has successfully avoided undue compression. The numerous excellent illustrations and coloured plates add appreciably to the value of the work, and it can be confidently recommended as one which meets fully the needs of students and practitioners.

Notes on Diseases treated by Medical Gymnastics and Massage. By Dr. J. ARVEDSON, Arvedson's Gymnastic Institute, Stockholm. Translated and edited by MINA L. DOBBIE, M.D., B.Ch., Medical Officer, Chelsea College of Physical Education. Pp. 280. London: J. and A. Churchill. 8s. 6d. net.

THIS little book is the translation of a text-book from Scandinavia,

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where it has been regarded as a standard work for 20 years. The objective is not to give an account of massage or gymnastic technique, but rather, as the title indicates, to provide the student with "notes" on the various conditions he is calculated to encounter in the course of his work. Treatment is indicated rather than described, for this has already been done in Kleen's *Massage and Medical Gymnastics*, so ably translated previously by Dr. Dobbie. The scope of the work is exhaustive and the scheme admirable. Each condition is taken in turn, the morbid changes, causes and symptoms being briefly enumerated. Treatment is then indicated. To compress all this information into less than 300 short pages is a superhuman task, and the result is that the matter leaves the impression of being "sketchy." Thus, fractures are dismissed in four pages, and all injuries to joints in a similar space. Muscle re-education is barely hinted at, and no special reference is made to the difficulties of dealing with septic cases, of which we saw so much during the late war. These faults can easily be remedied, but there are also many statements in the pathological part of the work, which do not accord with the teaching in English Schools. We encounter, moreover, many surprises in the sections dealing with treatment. To quote only one of each, we read as the cause of profuse menstruation that "lack of oxygen causes degeneration of the blood-vessels of the uterine mucous membrane," and we note a strong gymnastic table selected as suitable for the neurasthenic, who surely requires a more restful treatment.

The general impression left by the book is that the concentration has been too severe, and that it requires careful editing, if it is to be brought more into accord with English teaching.

Dermatology. By WALTER JAMES HIGHMAN, M.D. Pp. 454. London and New York: The Macmillan Company. 32s. net.

THIS volume of some 450 pages does not profess to be a book of reference, but rather a handbook containing the essentials of cutaneous medicine. It is mainly intended for students and practitioners, and concerns itself chiefly with descriptions of the diseases, their diagnosis and treatment. Academic discussions on their ætiology, and minute histological descriptions, are avoided. The book is well written, carefully planned, and the illustrations, though comparatively small in number, are excellent in quality, and have been lent from the collections of Dr. John A. Fordyce and Dr. George M. Mackee. A feature of the book is the stress which the author lays on the influence of internal medicine on skin diseases, and the importance of having a thorough knowledge of general pathology before attempting to understand the disorders of the skin.

Preparations, Inventions, Etc.

"OSCOL" STIBIUM.

(London: Messrs. Oppenheimer, Son, and Company, Ltd.,
179, Queen Victoria Street, E.C.4.)

This is one of the series of colloidal preparations, obtained by chemical processes which produce them in a perfectly stable condition. The use of colloidal antimony has been found to be very successful in the treatment of deep abscesses, boils, deep-seated impetigo, and other diseases due to cocci. Its use has been reported to have been successful in treating bilharzia, Leishmaniasis, soft sores, and stubborn cases of gonorrhoea. In conjunction with colloidal manganese, very good results have been obtained in gonococcal infections. It has been found to be of distinct value in the treatment of leprosy, and to be safer and more satisfactory than arsenic in the treatment of kala-azar. It is issued in "Aseptules" of 1 c.c. and 2 c.c. in boxes containing one dozen and in bottles containing 1 oz.

THE "TUBUNIC" AMPOULE-SYRINGE.

(London: The Hoffmann-La Roche Chemical Works, Ltd.,
7-8, Idol Lane, E.C.3.)

We have received a small book containing full details and description of this apparatus, together with a list of the "tubunic" solutions held in stock. The Hoffmann-La Roche Chemical Works will be pleased to forward a copy of this book to readers of THE PRACTITIONER on application.

AMBRIODIN.

(London: The Centaur Chemical Co., Ltd., 14, Clifford Street, W.1.)

In the July, 1920, issue of THE PRACTITIONER we called attention to the above preparation. It has now been improved by the addition of tonics, and milder laxatives have been substituted. The altered preparation should prove even more useful than the old.

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Epilepsy and some Kindred Attacks.

BY SIR ROBERT ARMSTRONG-JONES, C.B.E., M.D.,
HON. D.Sc.(WALES), F.R.C.P., F.R.C.S.

*Lord Chancellor's Visitor in Lunacy ; Lecturer on Mental Diseases,
St. Bartholomew's Hospital ; and Gresham Professor of Physic.*

THE most accomplished practitioner is sometimes puzzled to arrive at an accurate diagnosis, and sagacity in penetrating the import of symptoms indicates the skill of the able physician. It is, therefore, of the utmost importance that a correct clinical record of the patient's condition shall be presented for consideration, before the proper estimate of his diseased state can be apprehended by the doctor.

Two questions always arise in regard to any illness; the first is asked of the doctor by himself from his own personal experience and that recorded by others—i.e., so far as he has been able to collect this. It is: "What is the exact nature of the patient's illness?" The second is asked by the relatives or friends and is: "Will he get well, or how long will the illness last?" Both these questions have to be

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answered by the doctor. The first implies the Diagnosis, the second the Prognosis, and upon the reply made will depend the treatment, which must be based—if the treatment is rational—upon a correct estimate of these two enquiries.

To pronounce the diagnosis is to ascertain the seat and the nature of the disease from which the patient has been suffering, and under which he is now labouring; to frame the prognosis is to foresee and to foretell the probable course and the issue; and to direct treatment is to make a correct use of knowledge elicited by the other two processes.

The great value of an exact diagnosis is not always clearly appreciated, and this omission leads us in consequence to prescribe for a malady with occasional uncertainty, thus treating symptoms rather than their cause, for the reason that we remain ignorant of the nature of the disease and its exact situation. Under certain conditions, however, this is justifiable; for by treating symptoms we can often relieve pain, procure sleep, soothe irritability, and prevent anxiety, so making life tolerable until the disease has subsided, and by its disappearance the patient is enabled to convalesce. If, on the other hand, the nature and the origin of the disease is diagnosed, this discovery becomes an inestimable help in the treatment. There is an old axiom of Sir Thomas Watson's that "the knowledge of what a disease is, is half its cure," for then we apply our treatment with much more confidence, precision, and comfort than when we are only treating symptoms. The appropriate management of the particular disease thus tends to make treatment progressive, successful, and certain. Accuracy of diagnosis cannot be too highly estimated nor too diligently sought for.

Prognosis, or the foreknowledge of the course and termination of a disease, is an equally important and

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valuable acquirement to be attained by the physician, for this begets confidence on the part of the patient towards his doctor, adding to his reputation and credit—which is not only beneficial to the doctor, but helpful to the patient, as well as to his friends. Even if the prognosis should be an unfavourable one, it will often enable the friends to act towards the patient without crippling the finances of the family; whereas, if favourable, such a prognosis will justify a great expenditure for the immediate saving of life. The efficacy of remedial treatment is greatly increased by an intimate acquaintance with the nature of the complaint, and by the reliance which the patient can place, in consequence, upon the skill and judgement of the doctor; factors which, when realized definitely, assist recovery.

The application of the foregoing remarks to the correct estimate of a diseased condition has a very intimate relation and bearing upon those sudden and unexpected forms of illness described as “fits.” In these, the diagnosis and prognosis must be of vital import to the patient and to his family, for the condition is often a great “puzzle” to the doctor as well as a great anxiety to the patient, because some of these abnormal conditions are related to function, whereas others of almost exact similarity are based upon structure and are organic.

The study of disturbed functions must be of great practical value, for it is recognized that some morbid products are brought to light because of the disturbed functions to which they give rise, some diseases being regarded as only groups of such disturbances. Every organ in the body, and even every part of it, has its proper duties to perform, and under the influences of various morbid processes these duties or functions may become increased, diminished, or modified. In particular do the func-

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tions of the nervous system become changed, and not infrequently from inappreciable causes, for the changes may be so slight as to elude detection and the altered structure may be impossible to demonstrate. Some of the disordered functions, such as those of the brain, or spinal cord, or the nerves, may consist of only disordered sensations, and these may vary from slight local changes to almost complete general anæsthesia. The special senses may also become perverted, sight may be affected from dimness to complete blindness, and there may be an affection of hearing varying from increased sensitiveness or tinnitus to complete deafness. Taste and smell may become affected, and changes may take place in voluntary muscular power and control; some are suddenly seized in "fits" with loss of power resulting in paraplegia, hemiplegia, or in the loss of use of a limb—monoplegia—and these may be unaccompanied by any structural or organic changes. Again, tremors, spasms, or convulsions may occur, which are either functional or organic, whilst in some cases intellectual abnormalities, or loss of speech or memory may occur, such as the memory of a language or the revival of recent past events, the first symptom of which is some failure of the power of attention—which is the most important of the Mind's activities.

In the case of "fits," epilepsy stands out as the most common and frequent, for it occurs at least once in every 1,000 persons. It is one of the oldest known diseases; it has been described by Aristotle, and Hippocrates referred to its unfavourable prognosis when first occurring about adult age. The Romans invalidated the vote of an epileptic at the *Comitia Centuriata*. The symptoms are described in Holy Writ, and eminent persons have suffered from it in all ages. Some authorities have taken exception to its being called a disease, preferring to describe it as

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a syndrome; and whereas formerly it was a necessary part of the definition of epilepsy to include transient loss of consciousness, certain American authorities now assert that complete loss of consciousness need not occur in epilepsy, and may occur in hysteria. The best definition of epilepsy yet propounded is "an intermittent neurosis affecting consciousness." Its pathology is still doubtful, for some have maintained that no structural or organic changes are found after many years of epilepsy, whilst others have declared that changes are present, not only in the nervous system, but also in every organ in the body. Upon these views a classification of epilepsy has been made into two divisions, viz., functional epilepsy and organic or structural, the latter including widely differing conditions. Diseases such as syphilis, arterio-sclerosis, tumours of the brain, dentition, lead-poisoning, and Bright's disease have thus been included in epilepsy; but the relation between these diseases and convulsive seizures requires further elucidation before they can be included in the term, for to include them would be to make superficial and accidental features—such as are the convulsive attacks—to cover very widely separated states under the same term.

True epilepsy is characterized by sudden "seizures," of temporary duration and occurring at irregular intervals. In these seizures the patient loses consciousness, which is the essential feature of an epileptic fit, although in very exceptional "fits" some unusual mental disturbance may be associated with the unconsciousness, or follow closely upon it. It is, however, quite frequent for tonic spasms lasting a few seconds to be the immediate sequel to the loss of consciousness, this tonic state being followed by clonic spasms, lasting about two minutes at the outside; then profound unconsciousness with relaxed

limbs and stertorous breathing follow, being succeeded finally by drowsiness, heaviness, or sleep, for a period lasting from a few minutes to an hour. In the fit, the patient may bite his tongue, or he may stain his garments with his excretions, which are passed involuntarily. During the fit, the pupils are dilated and the conjunctiva is insensitive, the knee-jerks immediately after the fit are absent but are afterwards increased, and there may be an extensor reflex, but there is always some slight mental confusion, *i.e.*, immediately after idio-pathic epilepsy.

Fits which are not true epilepsy are best described as symptomatic, or "eccentric," epilepsy, because they are due to an irritation of the central nervous system by some stimulus from the periphery, such as occurs in infants at dentition, from worms or some foreign body, from constipation or some unsuitable or undigested food acting through "dyspepsia," or with the onset of an acute disease, or in adults associated with delirium and due to indiscretions in drinking, or after unsuitable food. The fits in this class cease upon the removal of the irritation, and the disease is then cured. In these instances they are described as diathetic, because the reflex centres themselves participate in the disorder; sometimes they are described as eclamptic fits, or eclampsia, because there are rarely any mental changes in them resembling those occurring in pure or idio-pathic epilepsy, and usually too, the actual attack or paroxysm is shorter in duration, whilst consciousness is rarely completely obliterated, although it may be temporarily "clouded." Sometimes fits of peripheral origin may be followed by coma and persist, assuming chronicity, and it is important, even in fits not of central origin, to break the "habit," the symptoms of peripheral origin having become "facilitated" into a habit by repetition. Sometimes in

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adults after a strong emotional storm an epileptic seizure may occur, but these are of central origin.

The fact that during the war, as well as since, epileptic fits were feigned to evade service overseas and secure and continue pensions granted, makes it of great importance to diagnose true epilepsy from simulated seizures, as well as from the purely hysterical attacks which were not uncommon in women before the war and in men during and after the war. There are at least a dozen different kinds of seizures or attacks, which are related by some symptoms to epilepsy, upon which it is most necessary in the public interest, so as to protect the public service and the insurance societies, and to prevent accidents, that a correct diagnosis should be arrived at. The different kinds of fits may be summarized as follows:—

1. True central idio-pathic epileptic seizures, which have been described above.

2. Simulated or feigned fits. There are certain symptoms in the true fit which cannot be simulated, one being the due relation of the tonic to the clonic stage, the dilated pupil and the insensitive conjunctiva; these and the sleepy stage are not observed in feigned epilepsy, and are practically impossible to assume. If they are present, no further corroborative proof is needed. Usually the choice of the site for having the fit may help to decide the nature of the fit, for the simulated attacks generally occur in public places or where the person can be seen and pitied.

3. Syncopal attacks may be mistaken for epilepsy, but should not, because the *petit mal*, "sensation," "turn," "attack," as the fit is variously called, is quite different. In these attacks, the loss of consciousness is less sudden, and the patient glides down rather than falls. The subsequent "headachy," "sleepy," or "tired" stage is also much more definite in epilepsy. With "heart-block," epileptic fits may occur from cerebral anæmia.

4. Hysterical attacks are most varied; to begin with, they occur in hysterical types of persons, in whom there is excess of emotion and who are vivid and erethetic, as compared with the dull, slow, deliberate, and sometimes stolid epileptic, whose manner exhibits general sluggishness of the voluntary movements. As a rule, too, there is no loss of consciousness in hysteria, the symptoms on the mental side being of an exaggerated intensity, often "converted" into some loss of control on the sensori-motor side, which, however, may not last. The convulsions of hysteria are chiefly clonic, rarely tonic, whilst mental instability and unreliability are

great features in hysteria.

5. Catalepsy, or self-suggestion, with rigid postures and complete absence of response to the outside world, is often associated with mental abnormalities, especially with the condition described as dementia precox. There is a persistence of the position into which the limbs are moved owing to the balanced state of muscular contraction. In some instances, the cataleptic state is like that described as "trance," "reverie," or "brown study," except that these are usually associated with a limp state of the muscles more resembling sleep and therefore more allied to the post-epileptic state. There are several authentic records of persons having been buried in a state of catalepsy or of trance and waking up in a vault out of which it has been impossible to escape. This state is one into which it is possible for the person to enter at will, but it needs to be separated from epilepsy and dementia precox.

6. General paralysis. The first symptom of this grave disease may be the occurrence of an epileptiform seizure, which has been mistaken for true epilepsy. The Argyll-Robertson pupil (inactivity to light but activity to accommodation) is present in this disease, and some slurring of speech, or tremor, especially during excitement; the reaction of the cerebro-spinal fluid obtained by lumbar puncture is "positive Wassermann," although that of the blood may be negative, and there are lymphocytes in a field of magnification of about $\times 300$ varying in number from six to infinity, and even six may be suspicious, for there should be none unless a vein has been pierced by the needle.

7. Convulsions from renal disease are closely related to the above, and have been mistaken for them. They are of the toxæmic group or diathetic type, and are allied to those occurring from acute disease or from excessive alcohol. The condition arising from lead poisoning—so-called saturnine encephalopathy—is of this kind, and is identified by the blue line along the edges of the gums, headaches, a weakness of the wrist, and colic. Similarly, the convulsions from mercury, now rarely met with, are diagnosed by the associated symptoms of this form of metallic poisoning.

8. Fits may be associated with arterio-sclerosis and raised arterial tension, and apparently from no other cause. Epilepsy rarely begins after 25 years of age; but occasionally a fit of the *grand mal* type occurs for the first time about the age of 40 to 45 years; under appropriate treatment, such as a course of iodides or nitrites directed to relieve the blood-pressure, such fits cease to recur. Other symptoms are insomnia, giddiness, palpitation and headaches with loss of memory and concentration.

9. Apoplectic, hæmorrhagic, thrombotic, or embolic seizures are associated with heart complications or arteritis, and are characterized either by transient giddiness or dizziness, pupillary inequality, and the usual unilateral symptoms, there being permanent asymmetry of the two sides. The reflexes are unequal on the two sides, and may be absent on the affected side until the onset of spasticity which then becomes exaggerated; on the affected side,

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the extensor reflex appears when degeneration descends.

10. Fits may be associated with syphilitic disease of the cerebral arteries and meninges, a disease which shows itself in (a) a thickening of the *intima*, of a crescentic shape, encroaching upon the lumen, in consequence of which a diminished supply of blood to the brain is provided, and the anæmic or ischæmic brain, being the most irritable, causes fits; (b) the mes-arterium may be primarily affected; or (c) an extensive infiltration of lymphocytes may occur outside the blood-vessels, giving rise to periarteritis. The positive Wassermann reaction of the blood confirms the symptoms of giddiness, headache—especially at night—temporary amnesia, slight mental failure, and some sensori-motor defects. It is in these cases that vigorous anti-syphilitic treatment is so beneficial; some resemble in their symptoms those of general paralysis, and to these the term “quasi-general paralysis” was formerly applied.

11. Fits resulting from foreign bodies, such as worms, constipation, dentition, or some dyspeptic conditions have already been referred to.

12. Fits occurring from gross brain lesions, such as cerebral tumours, foreign bodies in the brain, fractures of the skull with depression, and cicatrices, are often unilateral, corresponding to the part of the brain affected, and there is no complete loss of consciousness. The attacks may be relieved by operation, but the prospects formerly held out for cure by surgery in the case of cerebral tumours have not been fully justified, and are not so hopeful as was anticipated. It is probably the only possible relief that can be held out to the patient and his friends, but the serious risks need to be explained.

The pathology of epilepsy has been described under four categories: (1) the fits have been attributed to the presence of immature islands of neurons in the cerebral cortex, the stimulation of which excites them into activity, their vibrations extending to the whole cortex. That there are teratological areas of immature neurons in the cerebral cortex is an ascertained fact. (2) The accumulation of some toxin, which gradually increases in the blood until the fit becomes the culminating point, is supported by experiments on mice in regard to the coefficient of uro-toxicity, the urine immediately after the fit is more lethal than that collected later or even earlier before the fit; (3) the fits are due to the accumulation of blood-platelets in the cortical capillaries, but it is maintained that these are not formed in the blood-vessels during life, although they may be present in epileptics

after death; (4) the fits are due to vaso-constrictor reaction of the minute vessels in the cortex, thus causing anæmia of the brain and, in consequence, a greatly increased sensitiveness to internal or external stimuli, the so-called "Stokes-Adams" syndrome.

The prognosis or the prospects of recovery in epilepsy must depend upon the cause, and it is least satisfactory when there is a hereditary or collateral history. The cases in which epilepsy begins in early life are, as a rule, more amenable to treatment, and have a better prognosis, than cases in which the disease has begun in adult life. There are more epileptic males than females, in the proportion of 9 to 7; more men recover, and do so earlier. Night-fits are less curable than day-fits, but when the day-fits change into night-fits, it is a good sign. Mental instability occurs in nearly all cases of epilepsy, but if this is postponed and does not appear early after the attacks, the chances of mental changes not appearing are better, although some even with mental changes recover completely. The duration of the disease may be a life-time, but if cases that have been in the habit of having fits lose them under treatment for a whole year, this may be regarded as a recovery, but the treatment needs keeping up for another year at intervals. The *petit mal* or "sensation" type is stated to be more prejudicial to mental integrity than the convulsive attacks—the *grand* or *haut mal*. Danger to life from the fit is a very definite risk, not only because death may take place in the seizure—which in mental cases is not of frequent occurrence, for they are specially supervised—but because there are risks to life by falls in dangerous places. It is calculated that 12½ years should be taken off from the average prospects of life in the epileptic. In "symptomatic" epilepsy arising from organic disease very few ever recover,

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and in the symptomatic kind, described as "eccentric" or peripheral fits, about one-half are improved and one-third recover, whilst in the true idio-pathic form, of those who remain under treatment for a long time about 10 per cent. recover, but the term "recovery" is interpreted as freedom from attacks only for two years.

Treatment.—The treatment of epilepsy depends upon the diagnosis, and it is essential to separate cases of organic brain disease from the others (and to eliminate cases in which convulsions depend upon such causes as intestinal troubles, worms, dentition, lead-poisoning, uræmia, and the diathetic diseases—which give rise to the "eccentric" convulsions—from those of true idio-pathic epilepsy), before treatment is applied. It is most desirable that the epileptic should be maintained in good general health, a simple clue to which is the weekly weight. The present method of dealing with the general health by treatment in colonies or homes provides the sufferers with the maximum of open-air life, occupation, diversion and interests, and thus lessens anxiety about their safety, which certainly tends to keep up a normal outlook and sensibility. A regular life is essential, yet with the view of a healthy change, each day should vary, and an hourly "time table" should be provided. Attention to the digestion, secretory and excretory functions is of paramount importance, but the aim of curative treatment is to break the habit of the fits, *i.e.*, to arrest their recurrence and to reduce their severity. For this purpose innumerable remedies have been suggested; and this is an indication of their incurability, for almost every known drug and many other therapeutic agencies have been employed with unsatisfactory results. Of all medicines the bromides have enjoyed the greatest reputation, and have proved the most

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beneficial. Bearing in mind the possible autotoxic origin of the disease, it is essential that the patient should never suffer from constipation, the bowels must always be kept regularly active, and in this diet is a most helpful element. Some have urged an exclusively vegetarian dietary, but my experience is that patients so dieted do not appear so well nor are they as contented or as energetic and "well" as those upon a mixed dietary. Meat does not increase the number or the severity of the fits, and it is more in harmony with his surroundings if the patient is treated in the same manner as a normally healthy person. The general health is an important factor in the treatment of epileptics who are taking bromides or other medicines, for they tend to suffer from feebleness, congestive disorders, anæmia; suffering from these conditions the functions tend to be irregular, and this irregularity must be relieved. If this is done, there is less risk of intellectual impairment occurring in those who suffer from epilepsy.

The best remedies for controlling the fits are the three bromides in five-grain doses, together with one grain of the soluble luminal sodium twice a day, on alternate days or for three days and stop for three, viz., late in the afternoon and early in the evening, so as to secure the maximum effect towards bedtime. The biborate of sodium with bromides may be substituted if there is a tendency to drowsiness, which occasionally happens, for the luminal sodium is one of the dial, medinal, or veronal groups. Hydro-bromic acid in drachm doses three times a day has been most beneficial in cases with noises in the ears, and for these cases also Dr. Faivre's tablets of oxy-quinoteinmeine have been much appreciated. Monobromide of camphor in five-grain doses has helped to control the number of the fits, oxide of zinc in three-grain doses, and in children tincture of belladonna in

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ten-minim doses three times a day. Fowler's solution (*Liq. arsenicalis* Mij—v) has been added to the bromide in some cases with much satisfaction. The formula for bromidia has been administered with advantage in case of restlessness, but the formula is better suited to women when the *Cannabis indica* is left out. Nitrate of potassium, gr. v—x, has been useful when there has been an increase of blood-pressure. Anti-syphilitic treatment has given satisfactory results in the case of some young adults, especially when there has been paresis of some of the cranial nerves, or when the fits have been unilateral or begun on one side and extended to the other. For epilepsy associated with uræmia from renal or heart affection, theocin, gr. iii—v, three times a day for three days, in combination with *Tr. digitalis* or *Tr. strophanthus*, has acted most beneficially, relieving the dropsy and stopping the convulsive seizures by stimulating the heart. The reputed value of some physical remedies, such as deep inspiration before the aura, is confirmed and may ward off an attack, whilst compression of the carotids, and even ligature of the vertebrae, and cauterization have had their advocates, but the value of some remedies may be due to suggestion, the moral effect bringing about changes in the organic physiological processes of secretion, absorption, and nutrition of the body and thus indirectly affecting the emotional and intellectual life. It is helpful in treatment to record the number of fits daily and nightly, and the hour at which they occur, keeping a chart, too, of the sleep, the organic functions, and the body-weight in order to compare these under the influence of different remedies; the chart—which can be kept by the relatives—thus provides a most useful history of the progress of the case and keeps up an interest in the cure.

Medical Aspects of Enlarged Prostate.

By ROBERT HUTCHISON, M.D., F.R.C.P.

Physician to the London Hospital, Physician to the Hospital for Sick Children, Great Ormond Street, etc.

ENLARGEMENT of the prostate may present itself to the physician in various guises, which do not at first suggest the real seat of the patient's troubles.

CASES SIMULATING GASTRIC CONDITIONS.

When back pressure on the kidneys has reached a high grade and renal efficiency is much impaired, chronic uræmia may set in and take a gastro-intestinal form. The patient suffers from loss of appetite, nausea or vomiting, with wasting and sometimes also epigastric pain—a combination of symptoms which, in an elderly man, naturally suggests carcinoma of the stomach. The mere mechanical hindrance to the passage of urine also, apart from any question of uræmia, seems sometimes to derange the gastric functions and to give rise to abdominal pain and vomiting, which have sometimes been mistaken for the symptoms of gastric disease. The fact that the symptoms in such cases are immediately relieved by emptying the bladder shows that they cannot be due to mere uræmia. The term “uro-kinetic” dyspepsia is sometimes applied to them.

The following cases illustrate these gastro-intestinal manifestations of the large prostate:—

A gentleman of 72, though hale and active, had for long had frequency of micturition. A few weeks before he was seen, he

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began to suffer from headache and loss of appetite; for three weeks there had been thirst and polyuria, and for one week very obstinate vomiting and retching. He was well nourished and of good colour, the tongue coated, and the breath urinous. The bladder could be felt above the pubes; the prostate was much enlarged; the urine was clear, of low gravity, and contained no albumen. Under the cautious use of the catheter and the administration of diluents, hexamine, and bismuth, his symptoms subsided. A year later the prostate was removed, but he succumbed to heart failure some days after the operation.

A patient of 60 had for seven months suffered from vomiting, constipation, and pain across the abdomen, worse half an hour after food, and relieved by vomiting. He had lost flesh and strength, and had lately noticed frequency of micturition. He was a cachectic man with a dry harsh skin. On abdominal examination a tumour could be felt in the hypogastrium, which proved to be a distended bladder. The urine was acid and contained some pus and albumen. Per rectum the prostate was felt much enlarged. Renal efficiency tests showed that the excretory power was much impaired. He was not in a condition for operation and died soon after his admission to hospital. The autopsy showed great dilatation of the renal pelvis; the cortices of the kidneys were pale but not thin, the bladder greatly thickened, and the prostate much enlarged. The stomach was in a condition of "mucous gastritis."

CASES WITH POLYURIA.

When renal efficiency is much impaired as the result of old standing prostatic enlargement, the kidney is no longer able to excrete solids unless in a high degree of dilution, and polyuria and thirst then become prominent features of the patient's condition. These symptoms may set in quite suddenly, and suggest at first that the patient has developed diabetes, as happened in the following case:—

A gentleman of 69, who had previously enjoyed good health, began quite suddenly to suffer from extreme thirst with rapid loss of flesh and the passage of very large quantities of urine with occasional nocturnal incontinence. He was believed at first to have developed diabetes, but the urine was of a very low gravity and free from sugar.

On examination he was found to be sallow, much wasted, with a harsh skin and a bladder distended to the umbilicus. The prostate was much enlarged, but he was otherwise apparently sound for his age.

After a preparatory course of treatment by diluents, hexamine, and the use of the catheter, his prostate was successfully removed

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and his symptoms disappeared.

The treatment in such cases is to keep the patient in bed, give abundance of bland liquid, and to administer hexamine. The bladder should not be abruptly emptied, but the residual urine withdrawn in successive stages. Prostatectomy will have to be considered when the patient's condition has improved.

GERONTAL CONSTIPATION.

The above term has been applied by Dr. Hollis¹ to a form of constipation met with in old men, who are the subjects of enlarged prostate. The prostatic hypertrophy in such cases acts in part mechanically and in part, probably, by interfering with the normal coordinated movements of peristalsis. As a result of delay in emptying, the contents of the rectum become abnormally dry, and this adds to the difficulty of evacuation. In addition to the constipation, as he points out, such patients often complain of a feeling of distension in the upper rectum and they frequently suffer from irregularity of the heart and palpitation.

In all cases of constipation in old men, the possibility of enlarged prostate being the cause should, therefore, be borne in mind.

REFERENCE.

¹ *Brit. Med. Journ.*, 1916, 1, 677.

Orthopædic Surgery.

By A. H. TUBBY, C.B., C.M.G., M.S.

*Consulting Surgeon to the Westminster and the Royal National
Orthopædic Hospitals.*

ARTHROPLASTY.

BY this expression is meant the formation of a new joint, capable of giving support and affording purposeful movements at the site of an articulation, which has become ankylosed after injury or disease. The word "arthroplasty" has been substituted for "ne-arthritis," for the former expresses more adequately the surgical procedure involved.

The premier operation was performed on a hip by the late J. B. Murphy, of Chicago, in 1905, with good result. The details are accessible in text-books on "Orthopædic Surgery" and need not be repeated here. Many surgeons have attempted to follow in his footsteps with more or less success.

Dr. V. Putti, of the Rizzoli Orthopædic Institute, Bologna, and the successor of that original genius the late Dr. Codvilla, has demonstrated, by a series of operations extending over some ten years, the practical value of mobilization of ankylosed joints. During the last 13 years, he has performed 113 arthroplasties, of which 10 were of the jaw, 1 of the shoulder, 38 of the elbow, 1 of the wrist, 2 of the fingers, 17 of the hip, 40 of the knee, 2 of the ankle joint, and 2 of the toes. This wide experience enables Dr. Putti to speak with an authority second to no one. Of his excellent results, I can speak from personal experience, having visited the clinic at Bologna, and been

much impressed with what I saw.

Indications and Counter-indications.—Quoting from Dr. Putti's paper, read this year before the Annual Congress of the American Orthopædic Association, we read that owing to the successful results obtained in arthroplasty, the limits of the indications have become enlarged. Putti regards the indications as pressing in ankylosis of the temporo-maxillary joint, in bilateral ankylosis of the hip, and in the completely extended position of the elbow. For them and other forms of ankylosis many points must be carefully weighed before the operation is undertaken. Such are the general health, the character, and the social state of the patient. In all cases, the risks involved should be carefully explained, and no operation undertaken until it is clear that all other methods of disposing of the ankylosis have failed. The resistance of the patient to pain, to long and tedious treatment and confinement in a surgical institution must be taken into account. The patient must be prepared to co-operate willingly with the surgeon from beginning to end, and he must be intelligent and prepared to persevere. People of excitable and nervous temperaments are, therefore, not good subjects, and it is found that men make better patients than women.

Arthroplasty is best performed between the ages of 20 and 50 years, and is not adapted to children and old people. The length of after-treatment in a hospital is, in the case of the elbow, not less than six weeks, and of the knee twelve weeks. In advising or otherwise as to the performance of the operation, the patient's occupation should be considered.

Of great moment is the ætiology of the ankylosis, as to its pathogenesis, the local anatomical conditions and its duration. Post-traumatic fixation of a joint

is of all causes best suited for arthroplasty, and bony is more favourable than fibrous loss of movement. All pain and swelling must have passed away for some months.

It is more difficult to decide about the propriety of operation after infective arthritis. Clearly, it should never be attempted after the acute form, until we are sure no trace of the primary disease exists. This applies to war-injuries, which have been complicated by infection. A guide is afforded by enquiring when all sensitiveness of the joint disappeared; also, by waiting for a year from that time and by noting if there is any reaction to massage, hot air, and gymnastics. In chronic arthritis, it is far from easy to decide when the infection is over, *e.g.*, after gonorrhœal infection.

Tuberculous ankylosis does not lend itself well to the new procedure. We agree with Dr. Putti that, so far, ankylosis after tuberculous infection is the best cure. It may seem paradoxical, but the after-results in bony ankylosis are better if the muscles are atrophied (not paralysed), than if they are, as is often the case in fibrous ankylosis, in fair condition. Atrophied muscles, once the joint is active, soon recover their function, but not too soon so as to militate against the success of the operation.

As to indications special to individual joints, ankylosis of the temporo-maxillary joints is an urgent case, and risks must be taken. In bi-lateral fixed hips, it is better to operate on one only at first. Opinions about the knee will differ. Everything will depend upon the occupation of the patient, his suitability, the selection of the case, and the skill and experience of the surgeon. In 1913, I read a paper on "Ne-arthritis" before the Congrès Français de Chirurgie, detailing some cases. One was a knee case in which ankylosis followed the bite

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of a lion into the joint. As it was essential that the patient should be able to bend his knee in order to ride a camel, and as the sepsis had subsided, an arthroplasty was performed and 45° voluntary and powerful flexion were secured.

Treatment.—A sufficiently wide incision should be made. After re-secting the ends of the bones, the freshened extremities should be shaped according to their functions. One crucial point of the operation is to leave a sufficient gap between the new ends of the bones, and in every case not less than one inch will be required. We have often left more, and have had no cause for regret. All cicatricial capsule and ligaments are removed, and then the new bone ends are covered with fascia taken from the fascia lata.

After the operation, the part is immobilized in the slightly flexed position, and traction by weights is applied for a month so as to keep the bony surfaces apart. This is an essential part of the proceeding, especially in a lower limb. The first movements are made on the tenth day, and are carried out by the patient himself by a simple apparatus attached to the bed. When the wounds are closed, hot air treatment is begun and continued for some months, and the most important muscles are stimulated by electrical currents. When the arthroplasty has been done on a lower limb, the patient is allowed to walk after the thirteenth day. At the knee there is often a "critical period" when the joint becomes stiff and painful. It is well to suspend the hot air and passive movements for a few days and then resume. The stiffness, which is only temporary, soon passes away.

The *prognosis* and *results* of the operation require consideration. There are several collections of over 100 cases bearing on these points. They show that

judicious arthroplasty has proved to be of much functional advantage to the patients operated upon. A good result in the lower limb shows a useful range of movement, firm stability, fair resistance to hard work and is painless. In the upper limb, in addition to free movements, precision in their use is a criterion of success.

Some of Putti's patients operated on for arthroplasty of the knee and elbow have taken part in the war. Arthroplasty, according to his statistics, has proved successful in joints in the following order: (1) the elbow, (2) the knee, (3) the jaw, (4) the hip.

The secret of success lies in the right choice of the cases, in the technical precision of the operation, and in the accuracy of the post-operative treatment.

ARTHRITIS DEFORMANS OF THE HIP.

We would emphasize the importance, in the treatment of this distressing affection, of diminishing friction within the joint. This is the keynote of local treatment, and if we can at the same time arrange for movement, so much the better. In pronounced cases, we place the patient in bed and apply weight-extension. This serves to distract the joint surfaces, and very soon muscular spasm and pain subside. If the hip is flexed at the time when extension is begun, we place the limb on an inclined plane, as in the treatment of tuberculous joint disease. In 21 to 42 days the limb can usually be brought down into extension and abduction, *i.e.*, the movements of the joint, though not yet complete, are increased and are nearly painless. The patient is now allowed to get up, and walks at first with crutches and a patten on the sound leg, while the movements of the affected leg are safeguarded by a walking apparatus extending down the inside and outside of the limb to the heel

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of the boot into which it is fixed. In fact, it is a Thomas's hip splint with a pelvic band added, and a locking and unlocking arrangement by means of a ring-catch opposite the knee-joint. This allows the extended limb to swing freely from the hip. After a time the crutches and pelvic band are dispensed with, and the inner part of the groin ring of the splint is thickened, so as to form an ischial pad or crutch. The splint is made half an inch longer than the limb, and thus the patient's heel does not touch the inside of the boot. So, the patient's weight is transmitted directly through the tuber ischii on the affected side and through the locked knee-joint of the apparatus directly to the ground. Free movement at the hip without interarticular pressure and friction are thus arranged for. When the patient wishes to sit, he unlocks the knee joint of the apparatus and is able to flex his knee.

Gradually, the amount of walking is increased, provided that no pain is caused in the hip. In old standing cases it is advisable to continue the use of the weight-extension at night.

As to the results of this treatment, we can point to many instances of increased activity, improved range of mobility of the joint, and complete disappearance of pain. The method is one well worth an extended trial, for the lot of these patients is otherwise a hard one, owing to progressive lameness and loss of health from persistent pain, want of exercise, and inability to enjoy the amenities of life.

The Climatic Treatment of Early Phthisis in Well-to-do Persons.

By W. GORDON, M.A., M.D., F.R.C.P.

*Senior Physician to the Royal Devon and Exeter Hospital ;
Physician to the West of England Eye Infirmary.*

NOW that overseas climates are, with certain exceptions, once more available for those who can afford them, that the hopes once based on home sanatoria have unhappily not been realized, and that certain new facts are affecting the older theories, the time has come for a fresh start, on stricter lines, to determine the relative values, in the treatment of phthisis, of the various health-resorts with which we are acquainted.

The public will expect, and rightly expect, something more reliable than advice founded solely on theory, something also more satisfying than tables of "improvements," as formerly, or of "years of working capacity," as to-day. The man stricken with consumption does not ask to be "improved" or to be given "a few years more," he wants to "get well"; and by "getting well" he does not mean any nicety of pathology—some vanishing of scar-tissue; he wants to feel well again, to be rid of his cough and fever, to produce no more tubercle bacilli, and to carry on his work or play without the shadow of an early death continually hanging over him. What trustworthy information, about the best climate to get well in, have we to give him? I wonder how many of us have the vaguest idea. It is clear that we require

new knowledge.

In order to obtain it, we need a simpler mode of investigation. We shall be wise to take a hint from those very practical people, the surgeons. When a surgeon, who is a scientist, devises a new operation for cancer, what does he do? He selects his cases, choosing early ones, describes and classifies them, verifies his diagnosis microscopically, carries out his operation, follows up each case for a fixed number of years, and finally reports its freedom, or otherwise, from recurrence. We shall have to adopt a similar procedure for phthisis. We, too, must select our cases, choosing early ones, describe and classify them, verify the diagnosis by the discovery of tubercle bacilli, carry out our treatment, follow each case for a fixed number of years, and then report whether it is *cured* or not. By "cured" I mean freed from symptoms and from the presence of tubercle bacilli, repeatedly and diligently searched for. There are no insuperable difficulties about this, although obviously our task is more exacting than the surgeon's, who, so to speak, operates and has done with it. Once aware of the intention, I feel sure that the public would collaborate. The patients must be well-to-do persons, because at present no others can afford to carry out the necessary programme, and I suggest five years as a suitable period of observation.

But here it is necessary to guard oneself against possible misinterpretation. I am speaking of investigation, not merely of treatment. No one would wait for the appearance of bacilli to institute effective treatment of a case otherwise diagnosed as phthisis, any more than a sane surgeon would fail to remove what he believed to be cancer because he had not microscoped it. But such unverified cases should not be included in statistics; statistics are of no use when the diagnoses have not been placed beyond

question. In phthisis, there is only one sure method of establishing the diagnosis; that is by the discovery of the tubercle bacilli in the sputum.

The enquiry should therefore, in the first instance, be restricted to—(a) early cases, (b) in well-to-do persons, (c) with tubercle bacilli in the sputum. To begin with, I suggest two chief lines of investigation, viz. :—

1. A comparison of results at high altitudes, such as Davos and Arosa, with results at ordinary levels; because, before the universal acceptance of the German statements on Sanatoria, high altitudes were considered the most efficient climates for the treatment of early cases—with certain well-recognized classes of exception.

2. A comparison of the results at home sanatoria in different situations.

Naturally, a very large number of cases will need to be accumulated, because we know that early cases of phthisis require classification. But if a large number of observers will deal with their cases on the lines I have indicated and publish their results from time to time, sufficient material should presently be available from which to draw reliable conclusions. In this way, I believe we should attain a precision in the climatic treatment of consumption far beyond anything that has been possible in the past. Is it too much to hope that the profession will take this proposal into its favourable consideration?

Non-Gonococcal Urethritis.

By R. L. SPITTEL, F.R.C.S.

Surgeon, General Hospital, Colombo.

DISCHARGES from the male urethra, though most often due to the gonococcus, are also due to other organisms more frequently than imagined by those who do not examine, microscopically, the discharges of every patient coming for treatment. Every now and then the microscope will be found to reveal a surprise in an apparently clear case of gonorrhœa, and is often the mediator in what seems a very ugly business; for instance, when the constancy of a wife or the fidelity of a husband is impugned. Again when, despite the most suggestive symptoms, a patient avers his purity, but is at a loss to explain the source of his infection, the microscope will sometimes show the discharge to be non-gonococcal, and the patient will at least be saved the humiliation of having his ailment sarcastically dubbed "clergyman's clap" by a careless and sceptical medical man. These are but some of the reasons why the microscope should be used as universally and as repeatedly in cases of urethritis as the stethoscope is used in diagnosing and observing the progress of diseases of the chest.

But *the microscopical diagnosis of urethral discharges is not always as easy as it may at first sight seem.* True, in typical cases, whether of gonococcal or non-gonococcal urethritis, the picture is so definite that a novice cannot go wrong. The difficulty, however, lies in those cases in which other diplococci are found very similar in form and distribution to the gonococcus; or when, in a persistent gleet, secondary organisms obscure the picture of a latent

gonorrhoeal infection. Then the most expert feels he is treading on uncertain ground, and has to muster all his resources before committing himself to a diagnosis on which much may depend. If it often happens that a patient with even a creamy discharge (due to secondary organisms) may be permitted matrimony with impunity, sometimes a person exhibiting no signs at all of urethral infection—perhaps not even a thread in his morning urine—may be shown, on examination perhaps of a thread expressed by prostatic massage or of a discharge artificially produced by an irritating injection, to harbour gonococci. The mistake is possible either way; a case of gonorrhœa may be declared non-infective with disastrous results; or a non-gonococcal urethritis, resistant as it often is to every known method of treatment, may be declared gonococcal, and involve the patient in a despair that threatens to make of him a settled melancholic, obsessed with the chimera of a malady he does not possess. In justice, however, to human nature it must be admitted that for every one of the latter there are a dozen who accept the dictum with a smug and reckless equanimity, and some few who even affect in smoking rooms a pride in their affliction.

The whole difficulty in diagnosis rests on the fact that there are in the male urethra diplococci other than the gonococcus morphologically identical with it; and others very like the gonococcus in shape which share with it its predominant characteristics of intracellular grouping (Figs. 5 and 6) and being Gram-negative (Case 5, Figs. 7 and 8). "It is well," says L. W. Harrison, "to be very cautious about extracellular diplococci, even though they look like two opposed coffee beans and be Gram-negative. The gonococcus can be diagnosed with tolerable certainty only when it occurs as a Gram-negative diplococcus of typical shape

and typically distributed within pus cells.”*

It may be urged that there need be no great difficulty in the diagnosis of these cases; for with the Gram stain and cultural methods—not to speak of other tests—any doubts may be clinched. This is very largely true, but *the Gram stain is not always the sure thing it is so often taken to be*; for not only are there Gram-negative organisms like the gonococcus in urethral discharges, but many organisms take the stain equivocally—not excepting gonococci under certain conditions. For these reasons urologists invariably prefer to make methylene or thionin blue specimens to confirm the picture given by the Gram stain.

Again, *cultures do not always furnish the sure test in the class of case an appeal to it is most necessary*. For one thing, gonococci are hard to grow under the best circumstances—when, for instance, they are taken from the profuse purulent discharge of an acute gonorrhœa; how much more difficult, then, are they to grow when only a few gonococci are associated with a host of other organisms which tend to obliterate and overgrow them? The culture test has, perhaps, its most useful application when diplococci indistinguishable from gonococci are found to give on ordinary culture media abundant growths which proclaim them non-gonococcal (Case 6).

The upshot is that great reliance has to be placed on the non-differential stains as the routine procedure of the clinic; and the more experience one has of the microscopical appearances of urethral discharges the more is one able to depend chiefly on the non-differential stains for a diagnosis. The practice of apportioning a subordinate place to clinical data, and relying exclusively on bacteriological findings,

* The micrococcus catarrhalis and diplococcus intracellularis meningitidis are Gram-negative, and cannot be distinguished from gonococci except by culture; but they are seldom found in the genital tract.

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cannot be too strongly deprecated. To refer a case to a bacteriologist and relieve oneself of responsibility may appeal to some as an easy way out of a difficulty; but it is not the best thing to do. Indeed, it sometimes happens that the reports of even competent bacteriologists are given the lie by the clinical developments of the case; sometimes, the reports are too non-committal to be of any use. The clinical and bacteriological evidences should here, as elsewhere in medicine, be correlated and weighed side by side; and nowhere is it truer than in these cases that the clinician should be his own pathologist.

Here a theoretical digression is perhaps warranted that would help in a liberal interpretation of the varying forms of flora met with in urethral discharges. These flora have from time to time been described and more or less elaborately classified by various authorities, but certain forms exist that defy classification, and the possibility must be considered that some of the urethral diplococci remaining for varying periods after an attack of gonorrhœa may be *transitional, pleomorphic, or aberrant forms* of the gonococcus. Even gonococci in acute discharges do not invariably present an identical appearance; large, small, and irregular forms are observed in the same specimen apart from such a factor as leucocytic digestion. It is well known that culture media (salt solutions, for example) are capable of producing such changes in certain organisms as to make them unrecognizable; also that the pleomorphic forms so produced when grown back on their accustomed media assume once more their usual form. Attenuation in virulence may be obtained by growing some organisms in weak antiseptics. It is a justifiable inference then that organisms may in living tissues, exposed as they are to the antagonizing influences of the body, manifest changes in form and virulence,

and perhaps even in staining reactions. It is possible that gonococci become, after a time, accustomed flora of the urethra relatively innocuous to the patient himself, and non-infective on intercourse or, if infective, causing a milder and more transient infection than gonorrhœa. These conclusions seem warranted by a correlation of the microscopical findings with the clinical manifestations of certain gleet, and may, in part, account for the non-infectiousness of long standing gleet in married couples. Case 5 (Figs. 7 to 10) seems to show that morphological variations in micro-organisms may even be produced by tides in the patient's resistance in the space of a few days.

Symbiosis is known to account for variations in germ virulence. Early in an attack of gonorrhœa the gonococcus is present in the urethra in pure culture. After a time other organisms invade the urethra, and live symbiotically with (Fig. 4), and eventually altogether displace, the gonococci. The microscopical picture then presented may be closely simulated by certain intracellular diplococci which are often found sparsely herded with those of a mixed infection, but the clinical story of which shows conclusively that they are not gonococci (Case 3, Figs. 5 and 6).

VARIETIES OF NON-GONOCOCCAL URETHRITIS.

Non-gonococcal urethritis is usually classified as follows:—

- (1) *Aseptic*.
- (2) *Bacterial*, of which there are two forms:
 - (a) *primary*, (b) *secondary*.

(1) ASEPTIC URETHRITIS.

In this condition no micro-organisms of any sort are found in the discharge, only leucocytes, epithelial cells, and some mucus. A variety of factors produce it; all more or less of the nature of trauma of the

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mucous membrane.

(a) *Strong injections of chemicals*, such as solutions of silver nitrate, protargol, potassium permanganate, etc., used with the object of preventing gonorrhœa soon after exposure to infection. This discharge, if left alone, subsides in from 12 to 48 hours. The continuance of irritating injections, in the course of an attack of gonorrhœa, by over-zealous patients impatient of cure may maintain a discharge indefinitely long after the gonococci have disappeared; the stoppage of injections then causes the cessation of discharge. The tolerance of the urethra to injections varies with the individual; while some respond with irritation and catarrh to even the weakest solutions, others are not affected by comparatively strong ones.

(b) *The passage of irritating crystals*, such as uric acid, phosphates, and oxalates.

(c) *Certain foods* such as cresses and asparagus in persons with an idiosyncrasy for them, also excessive indulgence in hot curries.

(d) *Excessive sexual intercourse*, especially when combined with overmuch drink and exercise. The incubation in these cases is as a rule longer than in gonorrhœa, the discharge not appearing for one to three weeks. The symptoms, too, are less acute; pain is slight, the discharge scanty, and milky or yellowish white; a few filaments float in clear urine. Luys states that, on examining the women responsible for the discharge, he has never failed to find some such pathological condition as metritis, salpingitis, etc. While most of the cases yield readily to irrigations and injections, some prove exceedingly resistant.

CASE 1.—E. C., a pale anæmic person, after indulging excessively in alcohol and sexual intercourse on two successive days, noticed, 15 days later, a yellowish discharge at the meatus and a smarting sensation on micturition. A smear taken at the time was said to show a few extracellular diplococci and an abundance of leucocytes. I saw the patient 28 days after the appearance of

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symptoms. There was a glutinous mucoid discharge, which showed, microscopically, leucocytes, but no organisms of any sort. Floating in the urine were long, thin, friable threads of mucus; these showed only leucocytes and epithelium. On prostatic massage the right lobe was found so tender that the patient nearly fainted. Examination of the prostatic drop showed large numbers of leucocytes and lecithin bodies but no spermatazoa or organisms. Repeated examinations failed to disclose any bacteria. The cause, here, was strain and alcohol after long abstinence.

(2) BACTERIAL URETHRITIS.

Ætiology.—Any pyogenic organisms—staphylococci, streptococci, bacillus coli, pneumococci, sarcinæ, etc.—when introduced into the urethra may set up catarrhal inflammation with suppuration. Such discharges when acute may not only be infectious, but complications such as epididymitis, prostatitis, and vesiculitis may result from them. Their similarity to gonorrhœa is thus very close. As a rule, they run a somewhat less acute, if sometimes more persistent, clinical course than gonorrhœa.

To enumerate the multitudes of organisms found in secondary urethritis is an impossible task. Certain types more usually met with may be mentioned. The drawings made from actual specimens convey more than descriptions can do.

Short slender bacilli (Fig. 1), occurring in chains and clusters in great abundance, constitute one of the commonest varieties found. They occur within and around large flat epithelial cells; leucocytes are not numerous in the field. They are common saprophytes of the prepuce, and usually complicate long-standing cases of gleet. They are very similar to the multitudes of organisms found in leucorrhœal vaginal discharges (Fig. 2).

The following varieties owing to their shape or distribution are apt to be mistaken for gonococci.

Short round-ended bacilli.—These, though Gram-positive as a rule, sometimes take the stain doubtfully

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(Case 5, Figs. 7, 8). They divide into short segments very like gonococci, and are intracellular. Further their resemblance to diplococci is also accentuated by their beaded appearance on staining—a feature

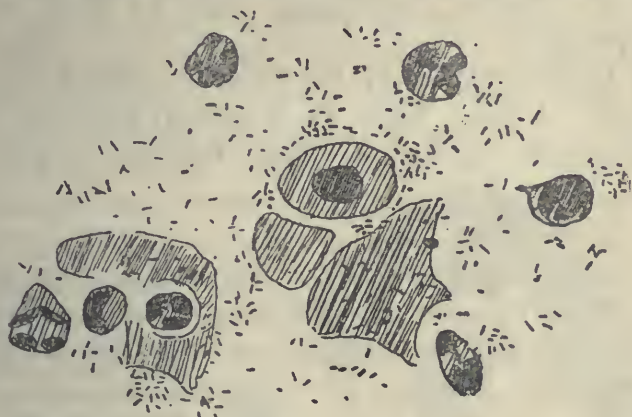


FIG. 1.—Organisms obtained from a scarcely perceptible moisture at the meatus (male). They are very like those found in leucorrhœa (Fig. 2), and are the type likely to infect the urethra under a long foreskin.

to which they owe the loose name diphtheroid or pseudo-diphtheroid.

Staphylococci are sometimes very like gonococci, and fail to retain the Gram stain; close observation,



FIG. 2.—Organisms from a purulent vaginal discharge (leucorrhœa).

however, shows that their elements are rounded and not flattened on one side like gonococci. Their grouping into grape-like bunches is typical.

Mode of conveyance of secondary organisms into

the urethra.—(a) By *sexual intercourse.*—The organisms contained in menstrual discharges, leucorrhœa, and utero-vaginal discharges of any sort are capable of transference to the male urethra by intercourse (Fig. 3).

(b) By *unclean instruments*, such as dirty sounds and catheters.

(c) By *bacteria about the meatus.*—This is seen in its most typical form in balanitis resulting from uncleanness under a long foreskin (Case 2).



FIG. 3.—Urethral Thread. — Secondary organisms keeping up a slight gleet, occasional smarting, and urethral threads two years after gonorrhœa.

Bacteria dormant in urethral crypts and follicles may be waked to activity by alcohol, erotic excitement, or trauma by sound.

CASE 2.—W. comes seven days after intercourse, complaining of “something wrong”; there is very slight irritation on passing urine, a slight urethral discharge, and a sense of fulness in the groins. On examination the end of the long foreskin is found to be reddened; on retracting it its mucous surface is thickened, red, and swollen; a purulent discharge bathes the surface of the glans, and seems to flow out of the meatus as well. The urine is slightly cloudy but contains no threads. A loopful of the discharge when stained is seen to teem with myriads of minute cocci on a field of stained mucoid strands enmeshing elongated leucocytes and epithelium. Washing with lotio plumbi, and a sanmetto and urotropin mixture internally, cured the condition in a few days.

(d) In *constipation* organisms entering the blood from the rectum and discharged with the urine find diseased spots in the urethra favourable for their growth; they flourish there and set up discharge, and sometimes the same complications (prostatitis,

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epididymitis, etc.) as in true gonorrhœa.

Bacterial urethritis may be primary or secondary.

I. PRIMARY BACTERIAL URETHRITIS.

This is usually found in men who have had coitus with women suffering from vaginal discharges, and who have not taken the precaution to use the douche before intercourse. Smears taken from these cases show a variety of organisms—staphylococci, streptococci, colon bacilli, slender bacilli, etc. Sometimes diplococci are found very like gonococci indeed; these have been termed pseudo-gonococci, occur in pairs with the members of unequal sizes, are generally extracellular, and decolorize with Gram. They grow easily, on ordinary culture media or serum-agar, as white opaque colonies, and are thus distinguished from gonococci which grow with difficulty in delicate colonies on serum-agar only, and unless frequently transplanted die out in a few days or are overgrown by the contaminating bacteria usually present.

The clinical picture of these infections is rather different from that due to the gonococcus. The incubation period is longer; there is not the same proneness to complications; the clinical course, though shorter and less severe as a rule, is sometimes exceedingly chronic, the discharge persisting for years.

CASE 3.—B., who had not bathed for a month, had a blood-

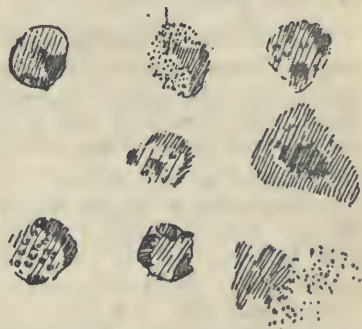


FIG. 4.—Mixed infection of gonococci and secondary organisms in gonorrhœa of four months' duration. Smear from urethral discharge.

stained emission 13 days after intercourse. He treated this with

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an application of carbolized vaseline to the glans, with the result that the foreskin became inflamed and did not permit of retraction for three days. He next noticed, three days later, a



FIG. 5.—*Intracellular diplococci and other organisms from simple abrasion of frenum. Compare with Figs. 4 and 6.*

milky patch on his shirt and an itching sensation in the urethra, and this induced him to seek advice. There was a gummy moisture at the meatus, which showed a very interesting microscopical picture (Fig. 6); there were small cocci and larger diplococci,

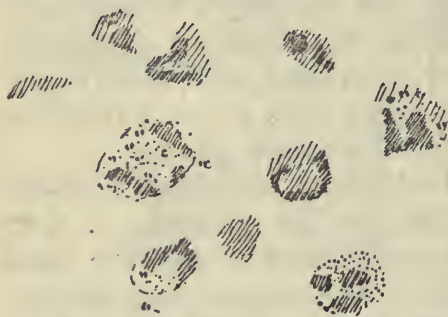


FIG. 6.—*Primary bacterial urethritis (Case 3). Smear of discharge. Two species of intracellular organisms are present; some of them diplococci, very like gonococci. Compare with Figs. 4 and 5.*

very like gonococci, herded within leucocytes, other leucocytes were choked with minute organisms. Lead lotion to the prepuce and capsules internally caused the disappearance of the condition in three weeks.

CASE 4.—S., a middle-aged married man, was referred to me with a creamy urethral discharge, that had lasted a month. His wife, after two years' absence, had arrived on March 20, and though menstruation had begun the same day, they had intercourse. For several days before his wife's arrival the patient had an "uncomfortable feeling" in the penis. After the first connection there was a "slight burning," which gradually increased, and 12 days later a discharge of pus appeared and continued to appear each morning. Except for a slight burning feeling, there was no severe pain. Two days after the appearance of discharge the patient was put on a course of santal midi by a medical man he consulted. The discharge disappeared after a time, but on April 20 it reappeared. About this time his wife began to have

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smarting pains when urinating; these increased and became "unbearable" about the 27th "right from the vagina to the bladder and on to the left kidney."

I saw them on April 30. The husband was utterly at a loss to explain the cause of his trouble. Both he and his wife were exemplary people, and there was no reason to doubt the sincerity of their statements. However, on examining a thionin blue preparation from the husband's creamy urethral discharge, I found intracellular diplococci at a glance, and gave it as my opinion that, whatever the source of infection, there was no doubt as to its being gonococcal. They were treated with balsams and alkalies. The husband's discharge very gradually lessened. On June 4, however, he was laid up for a week with a severe attack of prostatitis; on microscoping the discharge and threads on this occasion, I found, on careful examination, that though the organisms looked very like gonococci, they were really not gonococci, and this I confirmed, both culturally and with the Gram stain.

This case is illustrative of a number of important facts; it shows (1) that gonococci may be so closely simulated by other diplococci that even an experienced eye may be misled at a casual glance; (2) that non-gonococcal infections are communicable; in this case first probably from wife (who was menstruating at the time) to husband, and then from husband to wife; (3) and that complications, such as prostatitis, may be caused by them.

2. SECONDARY BACTERIAL URETHRITIS.

In many cases of gonorrhœa a mixed infection takes place with other organisms, which persist for a long time after the gonococci have gone. Secondary bacterial urethritis is very common in patients who have had repeated attacks of gonorrhœa. After gonorrhœa, as is well known, the cylindrical cells of the urethral mucous membrane, which have great bacterial power, are replaced by squamous epithelium, which is not protective against common bacteria. Such a urethra is liable to react sharply whenever common bacteria enter it. In this way bacterial urethritis, following coitus with women free from definite leucorrhœa, may

be explained.

In patients with long foreskins and chronic balanoposthitis, the organisms are liable to enter a vulnerable urethra and keep up a discharge until circumcision is performed.

CASE 5.—F. developed gonorrhœa in January, 1911, in an out-of-the-way colony, and though he received no treatment for it, the discharge apparently ceased in three months. Increasing difficulty in micturition gradually supervened in the following months, and in 1912 he was treated for gleet by prostatic massage and had a stricture dilated, evidently after a rough fashion. In May, 1913, the stricture was dilated under chloroform in a hospital. He then developed "another go of gonorrhœa" in 1914; possibly a recurrence of the old one. This attack is said to have lasted six months. The stricture gradually tightened up subsequently, and one day, after horse-riding in England, the patient was seized with retention of urine. He went under the hands of a specialist, who treated him with gradual dilatation and prostatic massage. He was declared free from gonorrhœa and married in February, 1915. His wife never showed post-marital signs of infection. He returned to Malaya in March, 1915, and was always more or less troubled with the stricture. Repeated attacks of malaria started the gleet again in 1917; it was declared gonococcal, and was treated with a course of autogenous vaccines.

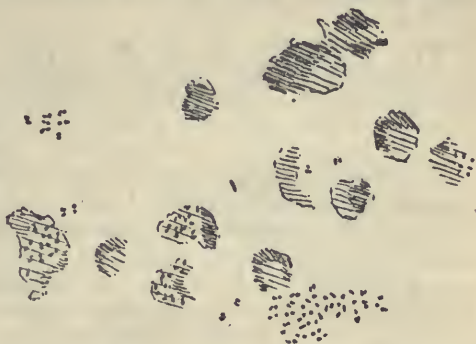
I saw the patient in the latter part of 1917, and found a dense bulbous stricture with a secondary urethral infection. After the second or third dilatation he developed catheter fever and transitory metastatic arthritis of the knee and ankle, which fortunately passed off in a few days. He was subsequently treated with Kollman's dilator, followed by irrigations before and after dilatation, combined with prostatic massage and instillations of silver nitrate to the prostatic and anterior urethra. Once the stricture was fully dilated he rather neglected coming up for dilatation at regular intervals. At this time I examined his seminal fluid, as he was anxious to have a child, and found no spermatozoa. I concluded, in the absence of a history of epididymitis, that his long continued prostatic infection had caused a closure of the orifices of the common ejaculatory ducts, and put him through a further course of massage and prostatic dilatation. Except for an occasional thread in the urine there was now no sign that anything was wrong.

In July, 1919, on his way to the further East on business, he developed, while on board, a discharge which lasted five days, and then quiesced. He saw a bacteriologist, who declared it gonococcal. When he returned there was no trace of discharge, but many threads, surrounded by a mucous cloud were present in the urine. On examining some of these as well as a drop expressed by prostatic massage, I found the organisms pictured in Figs. 7 and 8 respectively—obviously the organisms of a secondary

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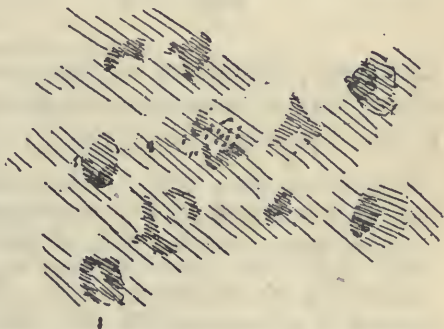
infection; but it was easy to see how they came to be mistaken for gonococci—they were intracellular and took the Gram stain

FIG. 7.—Intra- and extracellular bacilli; some so short as to resemble intracellular diplococci, very like gonococci. From a faint filament in urine. (Case 5.)



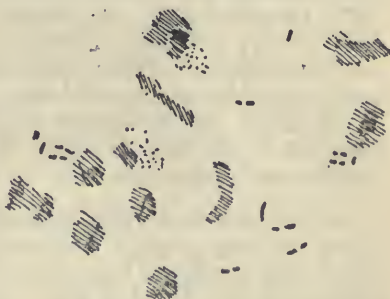
doubtfully. Cultural tests, however, proved them none other than mutation forms of rod-like bacilli present in clusters. Con-

FIG. 8.—Same organisms as in Fig. 7, in smear obtained by prostatic massage. (Case 5.)



firmation of this was provided by an examination of a thread and prostatic drop ten days later, when the same organisms were

FIG. 9.—Urethral thread from Case 5, two weeks after specimens shown in Figs. 7 and 8 were taken. Same organisms now elongated.



seen in a different phase, and could not now be mistaken for gonococci (Figs. 9 and 10).

The foregoing case seems to prove that organisms are capable of assuming pleomorphic forms according

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to the acuteness or chronicity of the infection, and to variations in the patient's resistance within as short a time as a few days.

The following cases show that vague and obscure symptoms of irritation, perineal discomfort, etc., so



FIG. 10.—*Prostatic smear from Case 5 taken at same time as Fig. 9.*

often complained of by patients, are in reality due to slight, latent secondary infections, and not entirely to the patient's imagination.

CASE 6.—F. came to me with a glutinous discharge and reddened and pasted meatal lips in the morning, symptoms which had persisted ever since an attack of gonorrhœa contracted five years previously. The urine was clear, and contained several threads (round, comma-shaped, and irregular) surrounded by a slight mucous cloud—resembling the urinary picture of a chronic gonorrhœa. Drinks made no difference to the discharge. Microscopically, the meatal drop showed diplococci like gonococci, except for an occasional tendency to barely perceptible elongation and slight irregularity in size; there was also some tendency to linear arrangement and tetrad formation; the grouping, therefore, was not quite typical. That these organisms were not gonococci was conclusively proved by cultures; the colonies growing luxuriantly on ordinary and blood-agar within 24 to 48 hours. The slight symptoms persisted in spite of energetic treatment, including autogenous vaccines.

CASE 7.—C. A. P. had gonorrhœa nine years ago. Since then there has been a slight discharge, with exacerbations on and off. There was a mucoid discharge at the meatus, and thickish heavy threads floated in very clear urine. Microscopically, the meatal drop showed fine, short diplo-bacilli in great numbers many of them intracellular, the leucocytes being packed with them; here and there large extracellular diplococci were present, which were, perhaps, due to meatal contamination, for they were not present in the teased-out threads, which contained fine diplo-bacilli in

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thousands, both inside and outside the cells. These bacilli and organisms exactly like gonococci (pseudo-gonococci) were often found herding in the same clump, and one form seemed to pass imperceptibly into the other.

CASE 8.—H. had gonorrhœa 14 months ago; the discharge ceased in three months, but left behind "an irritation in the passage which does not go, and which is now the only symptom; there is never any discharge; even excessive indulgence in alcohol does not bring it out." The urine contained one heavy thread, which, teased out on a slide, was found to be mucoid and gelatinous, and showed, microscopically, leucocytes, on a homogeneous ground of slightly stained mucus with a spacing round each cell; very fine organisms were present, a few small diplococci and larger diplo-bacilli. A smear, taken after prostatic massage, showed hardly any leucocytes, but here and there the same very fine organisms, as in the anterior smear, were seen, as well as a luxuriant group of diplococci that would have answered for gonococci except for the comparative scarcity of leucocytes in the specimen.

TREATMENT.

Non-gonococcal urethritis may yield to the simplest treatment, or may baffle all our resources.

Aseptic urethritis.—Here the cause, which we saw was of the nature of a trauma to the mucous membrane must be dealt with. If the discharge is due to strong and irritating injections, the stoppage of these is sufficient for a cure in 12 to 48 hours. When the passage of crystals in the urine is the cause, suitable drugs and dietary are called for according to the variety of crystal present; for uric acid, salicylates, potassium nitrate, etc.; for phosphaturia, acid sodium phosphate and urotropine; if the urine is alkaline, boric acid and ammonium benzoate should be given. The combination of balsams with any of these may be necessary to soothe the irritated mucous membrane, and astringent urethral injections of alum and zinc sulphate or potassium permanganate may be required. When catarrh follows excessive sexual indulgence, rendering the urine bland by means of alkalis and balsams may be all that is required, combined, perhaps, with astringent injections. These cases are

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sometimes very persistent, and may require more energetic treatment with silver nitrate irrigations, 1 in 4,000, and dilatations. When such measures are called for, a quiet infection will usually be found to explain the persistence of the discharge and threads in the urine.

Bacterial urethritis, when recent and primary, as a rule responds well to treatment with balsams and alkalis internally, combined with injections of protargol, alum, and zinc. Irrigations with silver nitrate or oxycyanide of mercury, 1 in 4,000, are particularly suited to these cases. The more resistant cases should be treated with dilatations, applications of silver nitrate (5 to 10 grains to the ounce) to infiltrations, and, if the prostate is affected, by prostate massage and silver nitrate instillations given with a Guyon catheter. When a long foreskin is the primary seat of an infection, feeding the urethra with organisms, circumcision should be performed.

Bacterial urethritis, especially when secondary, is sometimes more difficult to cure than gonorrhœa itself. Secondary flora flourish in the mucosa prepared for them by the gonorrhœal infection, the resistant cylindrical epithelium being replaced by squamous cells, which offer little resistance. Our most energetic resources, such as irrigations, urethroscopic treatment, full dilatations with Kollman's dilator, ionic treatment, and vaccines, etc., may then fail. Some men harbour a discharge and urethral threads for years in spite of every known method of treatment. In such cases, after a reasonable trial has been given to treatment, it is best to desist, in spite of the patient's importunities; for to persist indefinitely with energetic measures is to do more harm (such as to production of strictures) than good. The consoling feature with such persistent infections is that they need not preclude matrimony; the simple precaution should, however,

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be taken, if the discharge is at all profuse, of urinating before intercourse, just as when a woman suffers from leucorrhœa a preparatory douche is indicated. Otherwise the infection may be communicated and set up a vaginitis, urethritis, or other sign simulating gonorrhœa.

One practical point must be remembered, and that is *the necessity for irrigation both before and after instrumentation in the presence of urethral discharges whatever their nature*. This precaution prevents exacerbations of discharge and constitutional reactions (so called catheter fever), which may sometimes be so severe as to kill the patient with septicæmia within 48 hours, as when the discharge is abundant and the dilatation excessive. To dilate a discharging urethra amounts to nothing short of inoculating the patient with virulent germs, by rubbing them with an instrument into tears made in one of the most absorbent tissues of the body.

Subacute Bacterial Endocarditis.

By J. W. McK. NICHOLL, M.B., B.Ch.

Resident Cardiologist to the Ministry of Pensions Hospital, Orpington.

MUCH has been written on the special cardiac affections of soldiers, but among those still under treatment many have no other than the common valvular diseases seen in civil practice.

Many of these have been under my observation at a pensions hospital, and I have been struck by the frequency of subacute infective endocarditis amongst them. Because of the recent advances in our knowledge of this disease, and the importance of its early recognition, I shall discuss the diagnostic features of this disease as exemplified in 17 cases under my care. Not one of them was sent to hospital diagnosed as subacute bacterial endocarditis, though some already showed most of the symptoms and signs.

Ætiology.—A definite rheumatic history was rarely obtained, for pensioners dislike admitting that they had serious illness before military service, but four showed signs of mitral stenosis, and were, therefore, probably rheumatic. A positive Wassermann reaction was obtained in two cases only, while six were negative. A history of prolonged sepsis, in one case following multiple gunshot wounds, was obtained in seven cases.

Onset.—In all cases, with a single exception, a pre-existing valvular lesion was present. Some had been to work for some time before symptoms either of general malaise or cardiac failure made them seek admission to hospital. In none of them could it be said to be merely the terminal event in a prolonged

case of ordinary cardiac failure.

Symptoms.—(1) *Pyrexia.*—Pyrexia is certainly of the utmost importance in diagnosis, it may be said that every case of gross valvular disease with pyrexia must be regarded with suspicion. The charts of all these patients showed definite pyrexial periods, the temperature rarely rose above 103° F. In a certain number the pyrexia only lasted a few days, and another period of pyrexia supervened sooner or later; such a sequence continued often for months. In others the pyrexia was so slight and of such short duration that the true nature of the disease was not recognized until other signs, for instance, emboli or general adenitis, supervened and decided the diagnosis.

(2) *Pain.*—The commonest site is in the splenic area. Nearly all complained of this pain at some time, even in the absence of clinical enlargement. Hyperalgesia of the abdominal wall below the left costal margin is often present, and is probably due to perisplenitis, occasioned by a splenic infarct. Pain about the left breast is common in many other cardiac conditions, and is therefore of less diagnostic significance. Occasionally a “sternal pain” is present, commencing at the lower end of the sternum and passing upwards, but the pain is not of such a severe nature as in the other situations.

(3) *Breathlessness.*—An invariable symptom, it is usually due to the cardiac failure combined with the septicæmia, but sometimes to lung affections such as pulmonary infarct, or œdema of the lung. Some very interesting attacks occurred in one patient. He suddenly became unable to breathe, and stated afterwards that he felt he was being choked, but did not experience any great pain. He called out for air, but never became cyanosed, and the air-passages were quite clear, yet he was unable to take a deep inspiration. Between these spasms Cheyne-Stokes

type of respiration was very noticeable. These attacks were not due to pulmonary infarct, but at the necropsy it was found fresh vegetations had encroached on the coronary orifices.

(4) *Cough*.—Cough is not a constant accompaniment, but is distressing in some cases. Sweating is present in nearly all cases, beads of perspiration standing out on the face and hands. Weakness to a severe degree is experienced by these patients.

Signs.—The signs of this disease are of greater significance than the symptoms.

1. Presence of chronic valvular disease of the heart, with signs of failure and changing murmurs.
2. Emboli and their results—
 - (a) Infarcts of abdominal organs.
 - (b) Hæmoptysis.
 - (c) Paralysis.
3. Enlarged liver.
4. Albuminuria.
5. Blood in the fæces.
6. Changes in the skin.
7. Clubbing of fingers.
8. Blood-cultures.

Chronic valvular disease, with signs of failure and changing murmurs.—Pre-existing aortic incompetence was found in fourteen of the seventeen cases, mitral stenosis in four only.

In one case no sign of valvular disease could be found, but tachycardia was persistent and an occasional apical systolic bruit was heard. On many occasions it was impossible to hear a diastolic murmur in cases with undoubted aortic incompetence or mitral stenosis, at other times it became obvious.

In one patient a systolic bruit, loudest at the apex, was audible four feet away from the patient without the aid of a stethoscope, yet it disappeared

after two months' observation, and reappeared before death.

In two cases a systolic thrill was present at the base of the heart, it disappeared in one case but persisted in the other, and at the necropsies many vegetations were present near the aortic valve. These changing murmurs can only be explained by variation in the size and shape of the vegetations in the vicinity of the valves concerned.

The absence of œdema was noted in nine patients, and no abnormal rhythms were observed.

Emboli.—In all cases emboli were carried to some part of the body giving rise to infarcts, hæmoptysis, albuminuria, or paralysis.

(a) *Infarcts of abdominal organs.*—The commonest site for emboli was the spleen, that organ became palpable, and tenderness of the abdominal wall occurred over it. This pain was often acute and severe; the accompanying enlargement confirmed the diagnosis in some patients. Infarcts of the kidney were not so common, but their presence was surmised by the sudden onset of slight hæmaturia, and albuminuria.

These findings were confirmed at several necropsies.

Hæmoptysis.—At one time I had five patients who, during the course of the disease, showed hæmoptysis, which was shown *post-mortem* to be due to pulmonary infarcts of the lungs, though on clinical examination no definite cause was assigned.

Hæmoptysis was never profuse, but continued for over a week, gradually diminishing.

Paralysis.—Hemiplegia occurred in two cases, on the right side in one, and on the left in the other. A certain amount of recovery was noted, but some paralysis remained in both cases. One lived for nearly a year from the onset of the hemiplegia, the other only a few weeks.

Enlargement of the liver.—Enlargement of this

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organ is an almost invariable concomitant of cardiac failure. It was present in all cases, and came on early. The enlargement was not usually great, but the lower edge reached to the umbilicus in several patients. No other cause than chronic congestion was ever found.

Albuminuria.—The amount of albumen present in the urine was never great, and repeated examination in some cases showed none. This albuminuria has often led to an incorrect diagnosis; I found several patients with this disease who were being treated only for nephritis, but the diagnosis of endocarditis was confirmed at the necropsy.

Besides albumen a few hyaline and fatty casts were found in the urine, granular or blood-casts rarely, blood-cells and epithelial cells more commonly.

Blood in the faeces.—This is a common experience in highly infective states, and is not peculiar to this disease. It was never excessive in amount, and though these stools were often examined for organisms in expectation of dysentery, *Amœbæ histolyticæ* were never found.

Changes in the skin.—Petechiæ are the commonest skin lesion of this disease; they occurred in ten of the seventeen cases.

More especially are they seen in the terminal stages; they develop readily in œdematous subjects, their commonest situation, in my experience, was on the lower extremities, especially the extensor aspects. They were not found in the arms above the elbow, but were present over the clavicles, and the lower eyelids were another favourable situation.

They arise in crops, some fading to a brown tint, while others appear. Their significance may be noted as of bad prognosis, the end often coming within a few days or weeks.

Osler's nodes.—Osler's nodes are round red areas

of skin, occasionally having a white centre. I have only seen them on the hands and feet. They appeared suddenly and were painful, occasionally suppuration occurs and a small ulcer formed, otherwise their duration was just over a week.

Livedo Reticulata.—In appearance it closely resembled the scorched appearance seen after burning of the first degree. Scattered areas of bright red skin appeared over the face and chest, these quickly faded after causing intense irritation to the patient.

Café-au-lait colour of the face.—Café-au-lait colour is the apt term used to describe the peculiar tint of the face which most of the patients show. The cause of this appearance may only be guessed; it was not due to icterus, for the rest of the body and the scleræ were not jaundiced. It was also present in hemiplegic cases before definite attacks of jaundice occurred; it may be caused by a breakdown of the hepatic and suprarenal tissues following general septicæmia.

Sir James Mackenzie mentions an earthy colour of the face in aortic regurgitation, but this sign was present in cases without aortic regurgitation.

Clubbing of the fingers.—This was especially pronounced in four cases, none of whom were subjects of congenital morbus cordis, tuberculosis, or any of the diseases which commonly cause clubbing.

Blood-cultures.—One might expect a positive result would be obtained in most cases, yet this was not so; in only one case was the streptococcus viridans isolated from the blood, in the remaining cases no organism was grown, the media remained sterile after five days' incubation. On some occasions the blood was taken when the temperature was high, and at others when the pyrexia had subsided.

Modes of death.—The actual cause of death was a general toxæmia, on occasion emboli in various situations hastened the end, but the fatal ending was rarely

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due to emboli causing pressure on a mortal area of the brain and never to a massive infarction of the lung. The patients were quite conscious to within a few minutes of death in spite of the general toxæmia. Death usually occurred quietly without any ante-mortem struggle. Anasarca, though of great trouble, was never a direct cause of death, the amount of free fluid in the abdomen or the thorax was never so great as to imperil respiration.

Prognosis.—The prognosis is very bad in this disease, twelve of the seventeen cases have already died. In fact, it is a mortal disease, when any other result occurred, it was probably an error in diagnosis. Though this disease is now comparatively common, great difficulty may be experienced in making a diagnosis. In one patient the syndrome of signs seemed to be complete, and yet when the fluid was drained away from his legs, a steady improvement occurred, which persisted, and at present the patient is in better health than he has enjoyed for some months. Events, and events only, therefore show that this was not a case of infective endocarditis.

Another had persistent pyrexia, and has now been under observation for nearly a year, emboli occurred on several occasions, twice infarction of the lung with severe pain and hæmoptysis were noted, and yet apparent recovery has taken place.

Treatment.—Treatment in this condition was necessarily of a palliative nature, and consisted in the alleviation of symptoms as they arose.

Pyrexia.—As a routine, the patient was sponged with tepid water, if the temperature rose above 103° F., aspirin, sodium salicylate, etc., were occasionally used. Pain was primarily treated with local counter irritation, but when it became severe in nature, drugs were used, morphia as a last resource.

When coughing became troublesome, a linctus was

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used, such as linctus heroin (grain 1/12, in 1 dr.).

Breathlessness was alleviated by changes in position, and in certain cases the change to a heart-chair was followed by great relief.

Œdema of the feet became very severe in three cases, and resort was made to multiple small incisions in the legs, the fluid drained away.

The diuretics used with most beneficial effect were diuretin (theobromine sod. salicylate) and digitalis. Diuretin was given in doses of thirty grains a day for four days, and when the amount of urine began to diminish again, the dose was doubled for another four days. The tincture of digitalis only was used, and never in greater doses than a dram per day.

Other diuretics were found to have very little effect.

CONCLUSIONS.

1. Seventeen cases of subacute bacterial endocarditis among war pensioners were observed clinically over long periods. It is a mortal disease, and of greater frequency than has been hitherto believed.

2. The chief diagnostic features are:—

(a) The presence of chronic valvular disease, especially aortic incompetence.

(b) Pyrexia with apyrexial periods.

(c) Splenic enlargement.

(d) Recurrent emboli and petechiæ.

(e) Prostration, clubbing of fingers.

3. It may be diagnosed without a positive blood-culture; eight negative results were obtained and only one positive.

My sincerest thanks are due to Dr. John Parkinson, visiting cardiologist to this hospital, for his help and advice in the preparation of this paper.

Rheumatoid Arthritis: The Lesson of Twenty- five Years' Experience.

BY NAUNTON DAVIES, F.R.C.S.

Hereford.

PRACTICAL points in the treatment of this disease are sometimes lost sight of in the over-elaboration of speculative theories. I therefore propose to confine my remarks within narrow limits, and to record, in *THE PRACTITIONER*, only the results of my observations and treatment of rheumatoid arthritis over a period of a quarter of a century at Llandrindod Wells and elsewhere, where a great number of these cases flow in every season, affording the student exceptional opportunities of studying them closely in every conceivable condition.

It will be conceded, I think, that all the elements in the production of this disease are not definitely understood. As a comprehensive explanation of causation the microbic theory has been put forward, but, if it were the originator of the mischief, treatment with autogenous vaccine would not be the failure it generally is.

But there are cases, undoubtedly, in which microbic infection plays an important part; and where the constitutional disturbance is greater than the local mischief the presence of microbes may be suspected, and, if found, treated with vaccine and the local measures I shall presently describe. In my practice such cases have been exceptional, and for this reason it seems difficult to justify the wholesale extraction

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of teeth, whether they are good or bad, practised by some specialists, on the supposition that they harbour infection. If good results followed, there would be nothing to be said; but as they do not, except in rare cases, there is every reason to denounce this practice as an unnecessary barbarity.

The most constant factors which I have noticed, and which have been too consistently present to be mere accidentals, have been depressing surroundings, damp and cold, clay soil, business or domestic worries, injuries or shock, associated with hereditary predisposition.

It is common ground that rheumatism, gout, and rheumatoid arthritis are closely related to each other, flourish under similar conditions, and form together an aggressive family group. But we cannot trace out the minute details of their differences, to enable us to place them in well-defined categories.

Taking these unfixed factors into consideration, the question arises: Can anything be done to check the onward course of rheumatoid arthritis and restore the shattered health of the patient? The answer, I think, may reasonably be in the affirmative, provided that the cartilages are not seriously damaged, and that the affected joints are not contracted, and set at an angle which strains the skin (making it too thin and sensitive to stand effective local treatment), and prevents the possible restoration of movement.

These two conditions and the state of the general health govern the prognosis.

When an important joint, like the knee, has become flexed and fixed, there is little hope of restoring anything like normal conditions, although there may be a fair prospect of checking the activity of the mischief, lessening the pain, and making the sufferer's life bearable. The pity of it is that these contracted joints are largely due to carelessness, the neglect to

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keep the limbs straight during the sleeping hours, by means of splints or extension weights, which must be removed in the daytime to allow of necessary exercise—gentle persistent exercise, without violence or jerking.

Fortunately, it is only in a minority of cases that these serious complications are present; therefore, we have a wide range of cases promising good results under suitable treatment.

It may be said, with the sanction of experience, that local treatment is robbed of half its value if it is not assisted by constitutional, and that the latter is useless if the former is neglected.

It must not be forgotten that the strength of a rheumatoid patient is always at a low ebb, and that it should be an invariable rule to exclude measures which tend to lower the general health. For this reason, salicylates, salines, wet packs, hot air, Turkish and hot baths or douches of every description should not be used, except as temporary expedients to give transitory relief in the early stages of the disease.

The use of aspirin has become an abuse—the empirical refuge of the helpless and reckless. It is used indiscriminately, often in unjustifiable doses, with resulting heart weakness and lowering of vitality, thus bringing about the conditions which are fatal to lasting improvement. But it has its use, nevertheless, administered sparingly, for the relief of restlessness and pain, and not as a curative agent.

The measures just enumerated, together with mineral waters and massage, constitute traditional spa treatment. Excellent as many of them are in cases of ordinary rheumatism, they are unreliable as curative agents in rheumatoid arthritis, and, unfortunately, this conclusion is borne out by the number of chronic cases which struggle from spa to spa year after year, buoyed up with hope, only to return home in the end dis-

illusioned, helpless cripples.

It is not difficult to understand why mineral waters fail, when we remember that local physical changes cannot be got rid of by constitutional remedies alone. It would be just as reasonable to expect to remove a "hump" from a man's back by the administration of alterative pills as hope to clear away a mound of insoluble deposits from a joint by drinking waters. But although we may not build great expectations upon the efficiency of spa waters, they are useful in their proper place, as a means of flushing the kidneys and keeping solids in solution, in this way hindering their precipitation, although they cannot affect deposits to an appreciable extent when they have solidified in the tissues.

Another old institution that fails to stand the test by results is massage. Indeed, it is responsible for the loss of much precious time, during which the patient might have been recovering under rational treatment. Let us see how it acts. We know that rubbing creates heat, and that in rheumatic subjects uric acid flies to an inflamed or heated spot, and is deposited there; so we have massage creating heated areas as jumping-off places for the enemy. I recall the case of a man who twisted his ankle while out shooting. He had never suffered from any form of rheumatism before his accident; but there was hereditary predisposition. In a short time exudations occurred in the injured (heated) ankle, and increased and hardened until the foot became dislocated, and the patient walked on his external malleolus. In a milder form the same thing happens in men of uric acid diathesis who ride much, especially in hunting men. The fingers of the left hand, holding the reins, get rubbed—that is to say, massaged—by the horse's mane, and the knuckles of this hand become hot and, then, the seat of deposits. It is significant that the

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right hand, which escapes friction, generally remains unaffected. My personal experience as a hunting man confirms this interesting fact.

I have never known massage do good in these cases, but often harm. It is painful in practice and wrong in principle. There can be no doubt that injury and friction act alike in lighting up the dormant elements of the rheumatoid group.

So far, I have not referred to ionic medication. I am quite aware that this form of treatment has fallen into disrepute, due, I think, to faulty application. For instance, I have known a rheumatoid knee treated at a famous English spa in this way; one medicated electrode was placed on the affected knee, much too small to cover the area of trouble, and another on the sound knee, a long circuit being made through the body, the medicinal agents needlessly dispersed over the whole system. Such a method of application ignores the elementals of the process, and ingenuously insures negative results. I am bound to say that I have scarcely ever come across a patient, who was able to give me a satisfactory account of the application of this form of treatment.

Are we to condemn ionic medication on such evidence as this? We do not give up bread because we get indigestion after eating a half-baked loaf, but change the baker.

Let us consider ionic medication by results—when it is applied with some understanding of its nature and the conditions to be observed in its successful application.

And here I should like to make a confession of faith, based on a long experience of all forms of treatment in many varied cases. My conviction is that we have in ionic medication, properly applied, in conjunction with constitutional measures directed to the maintenance of the patient's strength, the only means of

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dealing satisfactorily with rheumatoid affections; but to get the best out of it the medication must be concentrated upon the affected joints through the shortest practicable circuit, and not allowed to waste its energies upon the righteous and unrighteous alike. Applied as follows, I have found tincture of iodine and carbonate of lithia give better results than any other agents I have experimented with. To illustrate the technique, the knee may be conveniently treated. Paint the patella and surrounding parts, where the activity of the mischief is most pronounced, with tincture of iodine; then soak a well-padded chain-electrode in hot solution of common soda, and place it over the painted area. Attach this electrode to the negative pole of a galvanic battery; next moisten a similar electrode in the same way, sprinkle it with finely-powdered carbonate of lithia, and place it under the knee (the electrodes should be large enough to cover the whole joint, and kept in place by a few strips of bandage, but should not come in contact at any point). Connect the lithia electrode to the positive pole, turn on the current slowly, and increase it gradually from 5 ma. to 20 ma. for the first ten minutes, then to 25 ma. for the next ten minutes. At the end of twenty minutes turn off the current as slowly as it was turned on, otherwise there will be a shock. You should find the skin decidedly reddened, and if it is not, it shows that the current has not been strong enough. Dry the skin, and dust on a little boric, or talc, powder. Repeat this treatment on alternate days, for thirty minutes, and increase the current to 30 or 40 ma., according to the tolerance of the patient. It may be noted that there is increased tolerance as the treatment proceeds.

In slight cases, a course of from seven to nine treatments is usually sufficient; but in more severe cases, a course of twelve or so had better be given, to

be repeated at intervals of three, six, or twelve months, according to results.

At the end of a course of treatment the skin should be red and rough, and thrown into little ridges. In this condition it absorbs the iodine almost as readily as a sponge. The application of iodox ointment, spread on lint, to the affected joint, tends to keep up the mending process during the intervals.

The condition of the skin just described *must* be brought about if good results are to be attained. It is far better, in the patient's interests, for the treatment to be too severe than not severe enough. But, while aiming at this result, it is just as well to lift the iodine electrodes occasionally during treatment, especially if the patient complains of burning in one particular spot, to see that the skin is not being damaged, for a burn is not pleasant, and heals slowly.

It is not wise to attempt to bring about the desired result too rapidly, but to reach it gradually towards the end of the course of treatment.

During the treatment there may be little or no sign of improvement. Indeed, the patient may feel even worse in the early stages, for the process breaks up the insoluble deposits about a joint, and sends them into the blood stream. If, at the same time, the excretory organs are inactive, there may be a good deal of general discomfort. The beneficial changes set in towards the end of the course, and become more definite in the weeks that follow.

We all, I suppose, understand more or less the theory of ionic medication. It certainly needs no further justification than the results which follow its proper application in suitable cases. It was Edison who first noticed that certain medicinal agents, when subjected to the galvanic current, behaved differently; some exhibiting an affinity for the positive pole, and others

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for the negative. Thus, iodine travels from the negative to the positive pole, and lithia from the positive to the negative. Consequently, in this form of ionic medication, the iodine when applied to the knee passes through the joint on its way from the negative to the positive pole; and the lithia does the reverse. So, you have them meeting in the diseased tissues, joining forces, and converting the insoluble deposits into soluble forms, to be taken up by the blood stream, and expelled from the system by the excretory organs. Nothing could be more simple, more appealing to reason, or more substantially justified in practice, when the due limits of the possible in any given case are intelligently observed.

But, even this remedy, effective as it is in the majority of cases, is of little use in cases in which the cartilages are eburnized and the bones ankylosed, for these conditions defy every known means of treatment, and are beyond redemption. It is dangerous to use force to restore movement in an ankylosed joint, for the attempt sets up inflammatory action, and brings about a more hopeless condition of things.

The moral of this is the importance of early drastic treatment on the only lines which experience has proved to hold out any hope of success.

I have now to refer to a type of case which resists this form of treatment. It is characterized by a good deal of pain, more than one would expect from the appearance of the affected joint. The explanation is to be found in an inflamed nerve in the painful area, and it may readily be discovered by my test for neuritis, and treated by the method I have described in *THE PRACTITIONER* (June, 1914). In this way the pain is quickly got rid of, and the iodine and lithia treatment may be reverted to with every prospect of good results. The rule is: When rheumatoid arthritis is complicated with neuritis, always treat the

latter first.

So far, the constitutional aspect of treatment has only been touched upon in a negative way, but it is just as important as local measures. The one is the complement of the others, like twins who gather strength from joint action.

The tired, nervy appearance of a rheumatoid patient is eloquent evidence of an exhausted system, and points to the necessity of supporting the failing strength, of building up, and not pulling down. And yet, how often are these signals of distress ignored and the last remnants of resistance sapped by salicylates and hot baths! It is time to knock this pernicious fashion on the head—for it is nothing else—and, if we could only make the ghosts of salicylate victims walk at the witching hour of night to disturb the slumbers of the ghost-makers, we should have some hope of succeeding. But, as it is, we can only point out the disastrous consequences of the system, and place on record an alternative method justified by results.

So far as medicine can help, and it can help a good deal, I have found nothing of more service in the building-up process than a teaspoonful of Fellows' Syrup of Hypophosphites and a teaspoonful of Sumner's Elixir of Formate of Soda, after meals, in half a tumblerful of soda water, to be suspended or given in smaller doses if there is headache or a foul tongue. Fowler's Solution may be added, if there is anæmia, or small doses of iodide of potassium, if there is much deposit in the joints and it does not disagree with the patient. In some cases, especially in pale women, citrate of iron and ammonia is of value.

These suggestions sufficiently indicate the line of treatment likely to be of service in this trying disease. It supports the flagging energies, and increases resistance to its never-ceasing attacks.

The question of dieting has been discussed and

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“solved” in every conceivable way, and authority can be cited for ideas which are essentially antagonistic and hopelessly confusing. The butcher’s shop and the wine merchant are commended on the one hand, and Oliver Twist’s workhouse and Pussyfoot’s paradise on the other. The practitioner is wisest who makes use of both with discretion, and allows himself to be guided by experience, and that alone.

My own experience has satisfied me that patients do best on a non-uric acid diet, and that it is unwise to introduce into the system the raw material on which rheumatism thrives, or anything, such as alcohol, which checks normal metabolism. Food which is supposed to be harmless can do a great deal of mischief if it is not well digested. Directly the digestive process slows down, the rheumatoid process flares up. Why should we repeat the discredited diabetic theory of Pavy in rheumatoid arthritis, and try to kill the disease by adding fuel to the fire? “A hair of the dog” does not always come off, unless it is in a roundabout way—when the disease dies, with the patient!

Put in the form of a short rule: The diet should be generous without being poisonous.

The amount of fluid taken should be sufficient to keep the solid constituents of the urine in solution, and not enough to wear out the kidneys. It is a mistake, in chronic debilitated patients, to prescribe large quantities of mineral waters during spa treatment to stimulate the kidneys to excess, and send the patient home to suffer the inevitable reaction. The change is too violent, a jump from one extreme to the other, and sweeps away the improvement which might have followed a milder course of waters at the spa and a continuance of a substitute at home. To prevent this reaction an effervescent Vichy tablet or two, given occasionally in a tumblerful of hot water, will be

found effectual, especially if it is taken before breakfast.

The excretory organs play such an important part in the elimination of uric acid and other toxins from the body that their activities need watching and assisting if there is any sluggishness. When there is constipation add an effervescing tablet of Carlsbad or sulphate of soda to the morning draught of hot water.

Environment is, of course, an important matter.

Residence by the sea, near a river, in fog-ridden valleys, on marshy or clay soil, or where the rainfall is high, should be avoided. A cheerful domestic atmosphere, from which gloomy prophets are banished, is a fine tonic for impressionable patients, who are painfully on the watch for indications of their condition in the head-shaking or smiles of their friends. The following incident brings this home to us.

A hunting man I knew very well was down with a severe attack of gout, and began to have visions of the better land. For indications of his daily condition he watched anxiously the face of his servant, who brought him his morning papers. If the servant smiled, the patient asked for "The Sportsman"; but if there was no smile "The Sportsman" was neglected and the Bible called for. Very human, and the moral is obvious.

I should like to lay stress on the importance of supervising ionic medication. I have always made it a rule to see my cases treated, and to vary the intensity of the treatment from day to day to meet the changing conditions of the patient. The best stereotyped prescription ever written cannot take the place of a more modest prescription intelligently varied.

The significance of it all is this: We must bring all our resources to bear, for it is only by concentration of our forces, omitting none of proved value, that we can hope to cope successfully with rheumatoid arthritis.

A Note on the Treatment of Vomiting in Malaria.

BY F. LOMAX WOOD, M.B., CH.B., D.P.H.
St. Helier ; late H.P. Manchester Royal Infirmary, etc.

IT is not uncommon to have to treat patients who have contracted malaria, especially of the malignant tertian form, and who suffer from vomiting of a severe character, which renders it difficult for them to take quinine and food *per os*. Under these circumstances, quinine has to be given intramuscularly, nourishment must be administered in a bland form, often iced, and resort may even be necessary to introduce the latter *per rectum* if the attack of vomiting is prolonged. Such at least were the methods open to me during my previous experience of this malady, for the administration of the drugs which had some influence on ordinary vomiting failed to relieve a similar condition in malaria.

Recently I had under my care a small series of 38 cases of malaria, amongst them 8 cases of vomiting, which occurred either during a primary attack or during a relapse. The first patient, an European about 26 years old, had, during a relapse, severe vomiting, accompanied by a little blood in the later ejecta when the effort of straining became more violent. I prescribed for him 7 minims of Liq. Adrenalin Hydrochlor. in 2 ounces of water. The vomiting and hæmorrhage ceased at once, and in 3 or 4 hours it was possible to give him light food and soon afterwards to let him take quinine. The

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second patient, a Scandinavian boy aged 13 months, and the third patient, an European man aged about 25 years, were not given adrenalin solution during their attacks of vomiting, which was protracted for 24 hours before they ceased. The fourth patient, an European lady aged about 34 years, had vomiting during the whole of one night, and sent for me in the morning because she was bringing up clots of blood amongst the ejected gastric contents. I gave her 7·5 minims of the Liq. Adrenalin Hydrochlor. in 1½ ounces of water, and, as the vomiting ceased at once, she was soon able to take light food and resume the quinine. Seeing that each patient to whom I had given the adrenalin solution had ceased immediately to vomit, I resolved to give it in every subsequent case. There were four such cases; of these, one was an European man, two were Goanese, and the last a Lascar, and in each of them a single dose of 7 or 8 minims of the adrenalin solution sufficed to relieve the vomiting at once. Not only did this distressing symptom disappear, but the patient was able to take quinine and nourishment better than before the vomiting occurred, and, during the remainder of the time I was in charge of these patients, there was not any further relapse amongst those who had taken the adrenalin solution. This remedy was given primarily to check the hæmatemesis, with a view to the constriction of the gastric blood-vessels, but as it brought about so rapidly the cessation of vomiting, it was subsequently administered when vomiting only was present and then proved quite successful. The number of cases mentioned above is very small, but as the adrenalin solution relieved the vomiting of all those to whom it was given, and appeared also to improve their condition materially, it seems worthy of further trial when this distressing symptom shows itself in patients suffering from malaria.

Practical Notes.

General Hospitals and T.B. Patients.

"The opening of wards in general hospitals for tuberculous patients, as recommended by the American Medical Association at its recent annual meeting in Boston, will, it is believed by the U.S. Public Health Service, be of enormous benefit not only to most of the two million known victims of the disease in the United States, but also to thousands of others in whom the disease is incipient and easily suppressible, if promptly treated. Tuberculosis in this stage is difficult and often impossible of positive diagnosis, even by an expert; and many persons, even when told by their family doctor that their case is 'suspicious,' and that they should take precautionary treatment, fear the stigma of an avowed tuberculosis hospital, and put off action until recovery has become long and difficult. In a general hospital the diagnosis will not be made public, and the family will not be embarrassed, but at the same time all necessary precautions can be taken to avoid danger of infection to others. The resolution was prepared and recommended by the National Tuberculosis Association in 1916; its approval now by the American Medical Association shows a very marked change in medical sentiment. In support of the new policy it is argued that in many small cities two hospitals, one general and one tuberculous, can be run only at a loss, but if combined would pay operating expenses, especially as the combined hospital would draw many secret tuberculous cases. Many general hospitals could easily enlarge their facilities by fitting up wards, roofs, porches, and unused open-air spaces, and thus provide greatly needed space for tuberculous patients, both former army men and civilians. The routine treatment of tuberculous patients in all general hospitals, instead of as at present in only about one-eighth of those in the country, should enable people in moderate circumstances to obtain preliminary treatment in their home towns instead of being forced to go without, or to go to resorts. Such preliminary treatment would habituate the patient to the *regimen* essential to his cure, and to the protection of others, and would enable him to go back to his home and get well under home treatment, as he probably would not have done without such training. Visits to the hospital will also familiarize members of the patient's family with sanitary precautions such as the sputum cup, which commonly horrifies them, and is soon given up by home patients. Visits by the family physician to his patient in the hospital would familiarize him with the treatment, and enable him to diagnose other cases much earlier. It would also enable him to supervise the later home-treatment of both this patient and of others."—*Health News: issued by the United States Public Health Service.*)

Reviews of Books.

Diathermy. By ELKIN P. CUMBERBATCH, M.A. M.R.C.P. Pp. 189.
London: William Heinemann, Ltd. 21s. net.

THIS exhaustive description of diathermy, the physical principles which underlie it, the construction of the apparatus, and its application in medicine and surgery, will be welcomed, not only by those who have the opportunity of using this treatment, but by all who are interested in electro-therapeutics. Although its medical uses are but comparatively slight, the writer has found it to be of some benefit in cases in which patients feel constantly cold, and for the relief of pain due to neuritis, or of symptoms due to high blood-pressure, associated with arterio-sclerosis. Its chief value is surgical, and it can be employed with satisfactory results for the destruction of new growths, even those which are too advanced and extensive for excision. Excellent results have been obtained also from it in the removal of rodent ulcers, nodules of *Lupus vulgari*, and non-malignant growths such as papillomata and *nævi*. Emanating, as it does, from a medical officer in charge of the electrical department of St. Bartholomew's Hospital, this book may be regarded as a reliable source of information of the technique and value of this treatment, based on close observation and experience. It is clearly and simply written and appropriately illustrated.

The Endocrines. By SAMUEL WYLLIS BANDLER, A.B., M.D.,
F.A.C.S. Pp. 475. Philadelphia and London: W. B.
Saunders Company. 35s. net.

AN author who writes a clinical work on endocrines to-day must draw largely upon inference and analogy for his conclusions. There is infinite scope for a fertile brain, and having hit upon a reasonable deduction one can test it clinically. If the expected result follows, possibly, but not necessarily, the basic hypothesis was correct. For success may be reached by the long arm of coincidence or result from unrecognized factors. The difficulty of the reader is to distinguish fact from conjecture.

The writer of the book under consideration is certainly honest in his endeavours, though perhaps sometimes premature in setting down conclusions as facts. Anyway, he has furnished us with a book of surpassing interest. He considers that man, physiologically and psychologically, owes his condition to his endocrines, and that this is still more true of "the weaker sex." Weaker, because of the instability of her endocrines. The idea is not new that the emotions, disposition or character depend to some extent upon the internal secretions—witness the words *melancholia* and *hysteria*.

REVIEWS OF BOOKS

But the author insists on the theory entirely and also its converse, that one's emotions react upon the internal secretions. He fully recognizes the interdependence of the different endocrines, and is quite willing to multiply their number. He favours pluriglandular therapy, but deductions drawn from such treatment are inevitably more liable to fallacy.

Admitting that subsequent progress may modify his conclusions, we cordially recommend the reader to let his fancy wander with the author among the misty heights of endocrines and psychology rather than to sleep among the dull rocks of fact at the foot.

Cæsarean Section. By FRANKLIN S. NEWELL, A.B., M.D. Pp. 200.
53 illustrations. London: D. Appleton & Co.

THE indications and contra-indications for the Cæsarean operation are discussed, together with the methods of performing this operation. Like some of the other monographs in this series, the first chapter is devoted to a short history of the subject. The author favours the view that the name of the operation is derived from the Roman law termed the *lex Cæsarea*, in which it is enacted that abdominal section should be performed on all women who died when far advanced in pregnancy, hence the name—Cæsarean operation. The author favours Cæsarean section in certain cases of eclampsia and in placenta prævia, when the cervix is rigid and its canal is not obliterated, or in women near term where there is disproportion between the size of the child and that of the pelvis. In performing the operation chromic catgut is used as the suture material for the uterus. Little reference is made to the subject of stretching or bursting of the uterine scar, of which so many examples are on record.

This monograph furnishes a useful account of the Cæsarean operation and its indications, and the technique of the operation is well illustrated.

Human Embryology and Morphology. By ARTHUR KEITH, M.D.
Pp. viii + 491. London: Edward Arnold. Fourth edition.
30s. net.

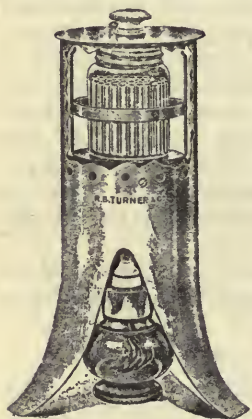
EMBRYOLOGY is notoriously a difficult subject, but with Professor Keith's volume in hand it becomes much simplified. After a brief general description of the early development of the ovum and embryo the author proceeds to consider the development of the individual tissues and systems of organs. From the practical standpoint, the opportunity is taken to discuss the origin of various malformations and conditions due to faults of development. In this new edition, recent work has been incorporated, much of the text has been recast, and in order to make the description of development more intelligible copious references to comparative anatomy and evolution are introduced. The book is fully illustrated with 490 figures, 80 of which are new.

Preparations, Inventions, Etc.

HOT-AIR STERILIZER FOR HYPODERMIC NEEDLES.

(London : Messrs. R. B. Turner and Company,
7-14, Eagle Street, Southampton Row, W.C.1.)

This apparatus has been devised by Dr. A. G. Shera as an attempt to solve the problem of the hypodermic needle, by preventing pain to the patient and deterioration of the needle itself. The apparatus consists of a tripod nickel-plated, steel sterilizer, 8½ in. in height, with an upper chamber, 3 in. by 2¼ in., in which is a bottle containing 40 needles which are supported by their hilts in open glass tubes, the points being free. The bottle is filled to one-third with liquid paraffin. The heat is supplied by a spirit-lamp underneath the chamber. Sterilization is completed in from 12 to 15 minutes when the liquid paraffin boils at about 118° C., when a metallic tinkling is heard.



The bottle is then removed from the sterilizer by a lifter attached to the carrier and placed in its case for transport. The needles can be used at once. Re-sterilizing is unnecessary once the bottle has been opened, provided due aseptic precautions are adopted and the needles are used fairly soon.

Needles sterilized and lubricated in this way are far more comfortable in use to the patient, and last much longer.

With the apparatus are supplied, if desired, an Arkansas stone, a leather case for the whole apparatus, a bottle of liquid paraffin, and a spare needle bottle.

“LA FRANCE : REVUE DE LA PRESSE FRANÇAISE.”

(London : Montague House Russell Square, W.C. 1.)

This is a new weekly journal, designed for all students of French. We have looked over the first issue and can recommend it as being thoroughly suitable for all who can read French or for parents whose children are studying the language. Special terms are offered to schools.

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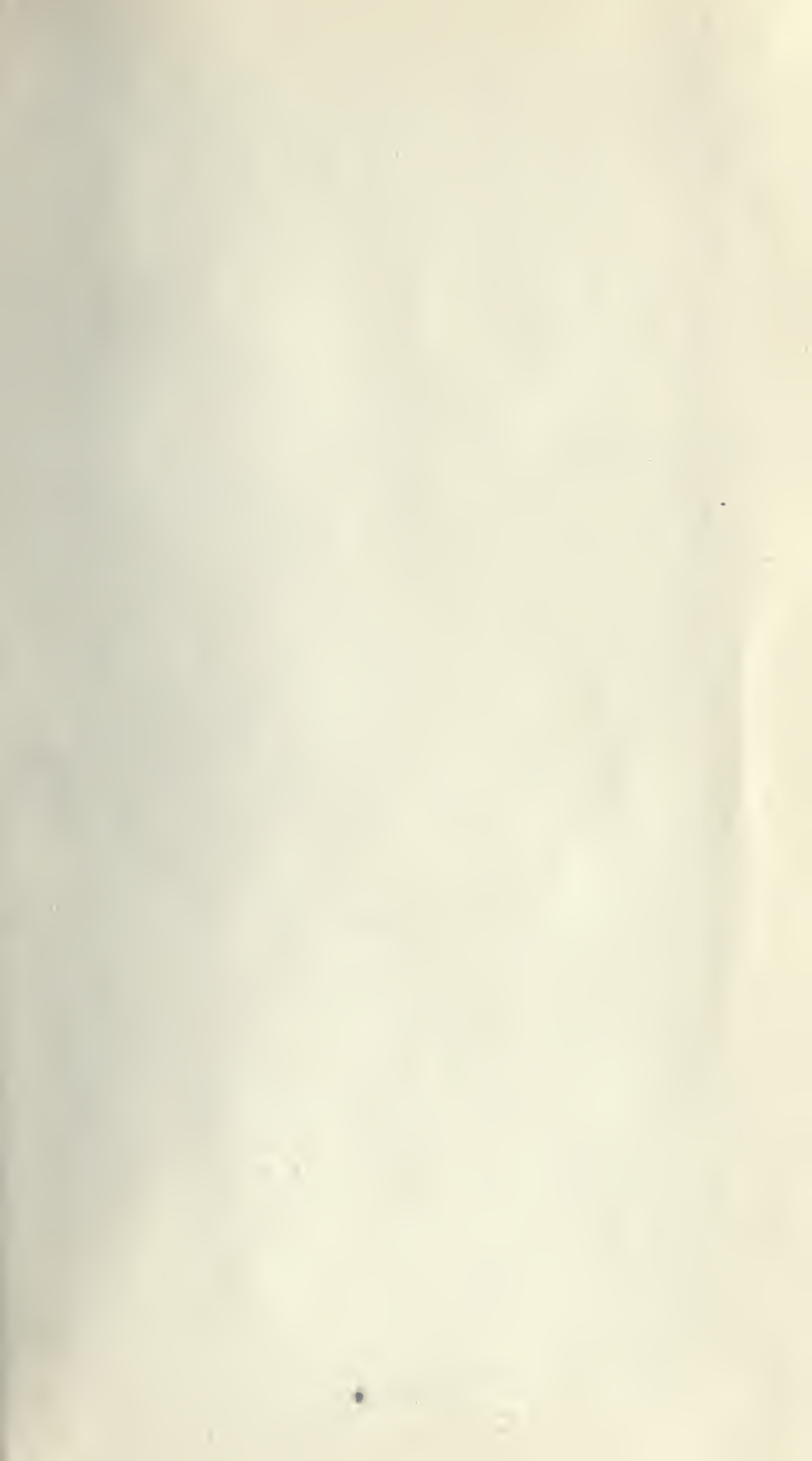
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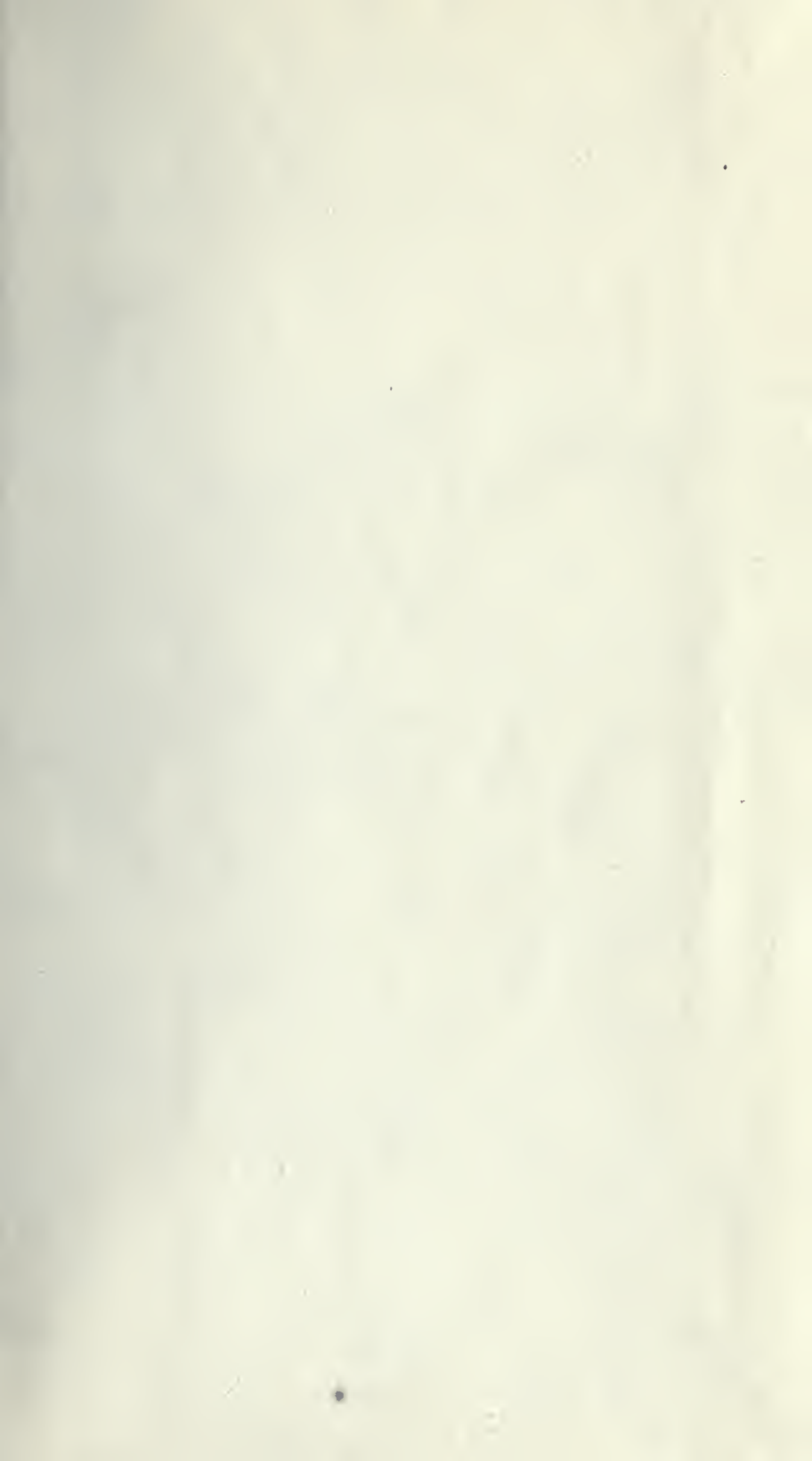
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